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CONFERENCE IN THE MATTER OF POLLUTION
OF THE SOUTH PLATTE RIVER BASIN IN THE
STATE OF COLORADO. 2ND SESSION, DENVER,
COLORADO, APRIL 27 AND 28, 1966. PROCEEDINGS,
VOLUME I

Federal Water Pollution Control Administration
Denver, Colorado

1966

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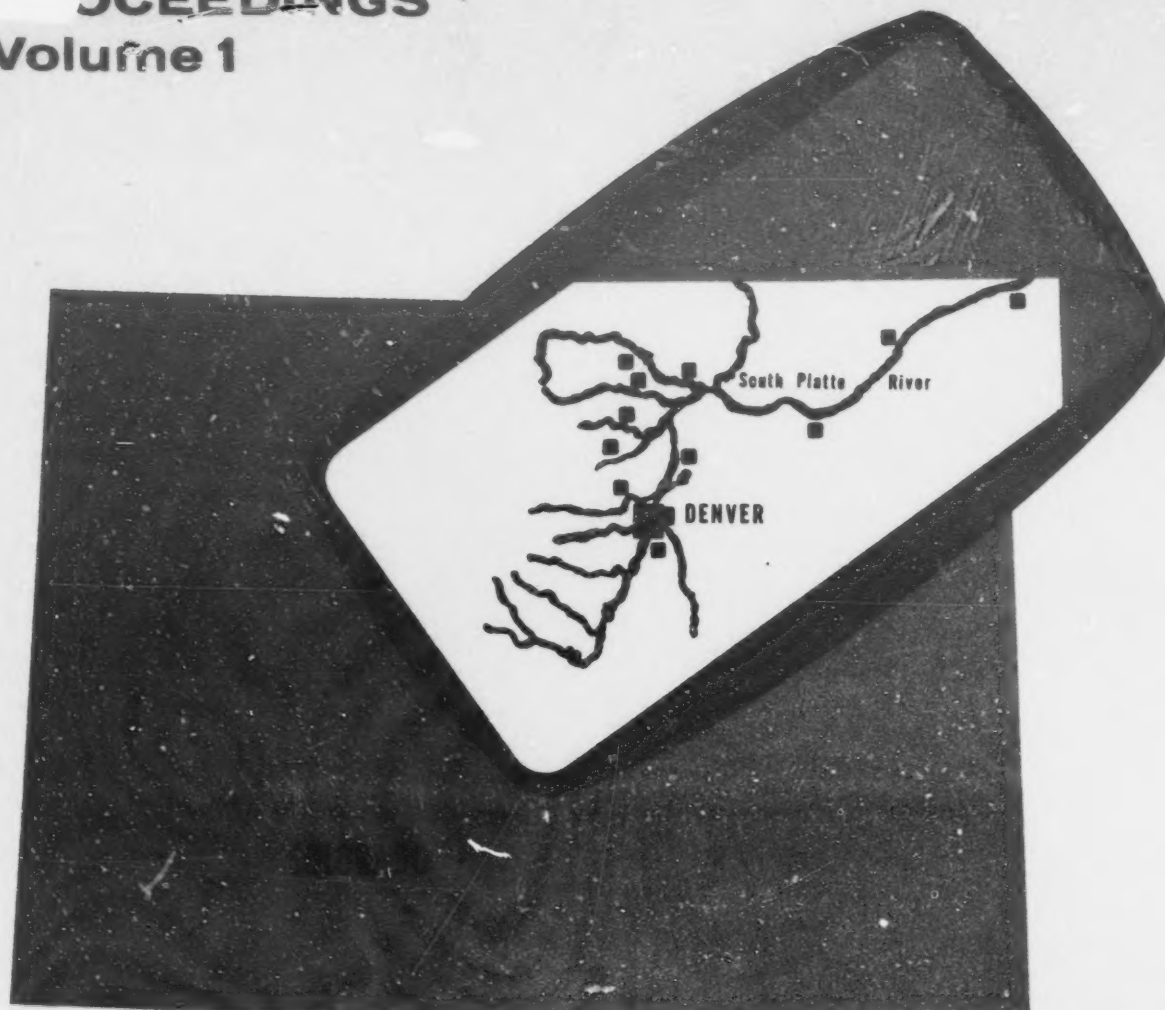
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PROCEEDINGS

Volume 1



Conference

In the matter of Pollution of the
South Platte River Basin
in the State of Colorado

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SECOND SESSION
DENVER, COLORADO
April 27 & 28, 1966

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

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Conference in the Matter of Pollution of
the Navigable Waters of the South Platte River Basin
within the State of Colorado, convened at 9:00 a.m.,
on Wednesday, April 27, 1966, at the Colorado State
Capitol Building, Denver, Colorado.

PRESIDING:

Mr. Murray Stein, Chief, Enforcement
Activities, Federal Water Pollution
Control Administration, Department of
Health, Education, and Welfare,
Washington, D. C.

CONFEREES:

Dr. Roy L. Cleere, Director, Colorado
State Department of Public Health

Mr. R. T. Eckles, Coordinator of Natural
Resources, Chairman, State Water Pollution
Commission

Mr. Lester Klashman, Regional Program
Director, Region VIII, Water Pollution Control
Administration, Department of Health, Education,
and Welfare, Denver, Colorado

PARTICIPANTS:

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Jerold D. Wingert, Manager, Metropolitan
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William N. Gahr, Chief Engineer of the Colorado
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Opening Statement - Mr. Stein

P R O C E E D I N G S

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: The conference is open.

As some of you might see, I brought my own gavel here. This (indicating) is how it compares to the Colorado gavel that was supplied. This is a wonderful gavel.

I might say ours is smaller, but it is a lot denser, and I guess you can draw your own moral conclusions from that, if there are any.

The second session of the conference in the matter of pollution of the navigable waters of the South Platte River Basin within the State of Colorado is being held under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended. The Secretary of Health, Education, and Welfare is authorized to call a conference of this type when requested to do

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so by the Governor of a State, and we have been requested by Governor Love to call this conference.

The purpose of the conference is to bring together representatives of the State water pollution control agency, representatives of the United States Department of Health, Education, and Welfare, and other interested parties to review the existing situation, the progress which has been made, to lay a basis for future action by all parties concerned, and to give the State, localities and industries an opportunity to take any indicated remedial action under State and local law.

The conference technique is rather an old one. It is used by many State agencies informally in the normal conduct of their business in the field of water pollution control. The concept of the conference was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York against New Jersey involving interstate pollution. I would like to quote briefly from the Court's opinion:

"We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing population living on the

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shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

We strongly believe in the conference technique and we measure our success by the situations which are solved at the conference stage, and not by court action.

As specified in Section 10 of the Federal Water Pollution Control Act, the official water pollution control agency has been notified of this conference. This agency is the Colorado State Department of Public Health.

Colorado is being represented by Dr. Roy Cleere, Director of the Colorado State Department of Public Health, and Mr. Richard Eckles, who is Coordinator of Natural Resources of the State, and Chairman of the newly constituted Water Pollution Control Board of Colorado.

I am happy to state that the members of the Board are down front in attendance at the conference today, and we are very, very happy to welcome the members of the Board to this conference.

I suspect your baptism might be a little

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abrupt, as this case on the South Platte River probably is as complex as any that we have run across.

I think you will note that the Federal Government is usually only in on the really difficult cases. The easy ones are resolved more frequently by other levels of government.

The Federal conferee is Mr. Lester Klashman, who is Program Director for this region of the Federal Water Pollution Control Administration, with headquarters in Denver.

My name is Murray Stein, and I am from headquarters of the Federal Water Pollution Control Administration in Washington, D. C.

The representatives of the official agencies are privileged to bring whomever they wish to the conference and have them participate in the conference. However, this is a conference between the State representatives and the representatives of the Department of Health, Education, and Welfare, and these parties constitute the conferees.

Both the States and the Federal Government have responsibilities in dealing with water pollution problems. The Federal Water Pollution Control Act declares that the primary responsibilities and rights for

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controlling water pollution rest with the State. Consistent with this, we are charged by law to encourage State action to abate pollution of navigable waters. However, the Secretary of Health, Education, and Welfare is also charged by law with specific responsibilities in the field of water pollution control, as pollution of navigable waters which endangers the health or welfare of any person is subject to abatement in accordance with the provisions of the Federal Act.

A first session of this conference was held October 29, 1963, in Denver, Colorado, in this same room. On the basis of a written request to the Secretary of Health, Education, and Welfare, dated July 18, 1963, from the Honorable John A. Love, Governor of Colorado, the Secretary of Health, Education, and Welfare, on September 23, 1963, called a conference under the provisions of Section 8 of the Federal Water Pollution Control Act (33 U.S.C. 466 et seq.), which was the applicable section then -- it is Section 10 now -- in the matter of pollution of the navigable waters of the South Platte River and its tributaries within the State of Colorado.

In light of the conference discussions the conferees unanimously agreed to the following conclusions and recommendations at the end of that first conference:

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1. The South Platte River and its tributaries within the State of Colorado are navigable waters within the meaning of Section 8 (that was the applicable section then; it is Section 10 now) of the Federal Water Pollution Control Act.

2. Pollution of navigable waters subject to abatement under the Federal Water Pollution Control Act is occurring in the Colorado waters of the South Platte River and its tributaries.

3. The discharges causing or contributing to the pollution come from industrial, municipal and agricultural sources. This pollution causes deleterious conditions which interfere with legitimate water uses, including municipal and industrial water supply, fish propagation and aquatic life, and recreational uses.

4. On the basis of the record of the conference, it is too early to make a valid judgment of the adequacy of all of the measures being taken toward abatement of the pollution. The conference discussions demonstrated that there are significant gaps in the knowledge of sources of pollution and their effects.

5. Pollution of the South Platte River from industrial, municipal and agricultural sources has created significant problems due to waste discharges containing high bacteriological concentrations; waste

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discharges with high biochemical oxygen demand resulting in dissolved oxygen depletion; and irrigation return flows which increase the inorganic chemical and solids content of the water to such an extent that legitimate uses are interfered with or eliminated.

6. Cognizance is taken of the objectionable odor condition present at Barr Lake.

7. Collection of data on the prevalence of persistent organic residues and other exotic materials, and dissolved trace organic substances, including heavy metals, is necessary to protect ground water from pollution.

8. A water quality management program for the whole river basin is necessary to provide for optimum water usage.

9. In accordance with Governor Love's request, the United States Department of Health, Education, and Welfare in cooperation with the Colorado State Department of Public Health, will initiate a joint investigation and study. This study will attempt to locate with particularity the sources of pollution having an adverse effect upon water quality; determine the physical, chemical and biological responses of the river to pollution; evaluate the previously located sources of pollution with respect

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to conditions in the river; compute waste load reductions necessary to obtain desired water quality; and recommend water quality control measures needed to effect the desired waste load reduction.

10. The cooperation of all Federal, State and local agencies concerned in this cooperative study is welcome.

11. Appropriate remedial action is not to be delayed awaiting completion of the study.

12. The Colorado State Department of Public Health has approved the plans of the Metropolitan Denver Sewage Disposal District No. 1 to collect and provide secondary treatment for all wastes within its district, to be in operation by 1966.

13. Commensurate schedules will be adopted for other communities and industries which have not joined the Metropolitan Denver Sewage Disposal District. These communities include: Loveland, Greeley, Fort Collins, Boulder, Fort Lupton, Longmont, Georgetown, Windsor, Fort Morgan, Sterling, Julesburg, Brighton and Ovid.

The industries in the State of Colorado for which commensurate schedules to provide waste treatment facilities will be established include: the Great Western sugar processing plants at Brighton, Longmont,

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Fort Morgan, Ovid, Loveland, Greeley, Sterling, Windsor, Eaton, and Johnstown; the mining and oil extracting and processing industries; and the Packaging Corporation of America, Denver.

14. It is recognized that additional State legislation may be necessary in order to achieve pollution abatement.

15. The conference will be reconvened periodically upon the call of the Chairman with the concurrence of the State of Colorado and the Department of Health, Education, and Welfare, to determine progress and to consider any developments in the study.

We are now here two and one-half years later, and reading that initial outline of the problem with the advantage of a two and a half year perspective, I don't think the conferees did too badly, because I think it stood up rather well. A lot of the things which had been pointed out, as will be indicated, have been done, but I think that is a pretty good outline of the problem.

The study has been made and has been completed in large part, and I might say in order to do this study, we found that we required a resident staff of 25 people, of Federal employees. This does not count the tremendous cooperative effort given to us by the State,

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and an annual budget of about a quarter of a million dollars.

This second session of the conference, we hope, will be useful in describing most of the problems clearly, in delineating the progress which has already been accomplished, and in indicating what remains to be done to correct the pollution problems of the South Platte and its tributaries.

I do think for a two and a half year study and the amount of money that was spent on it, the people of the United States, and certainly the people of Colorado, have a right to expect a pretty definitive analysis of the problem. I think this probably will be forthcoming, but it is your judgment to see what is done.

I also would say that this might be some of the problem in water pollution control or improving water quality management. Sometimes in dealing with a very difficult problem, such as you have had in Denver, it requires this kind of major effort just to get and evaluate the facts. Sometimes it is beyond the capability of any State government, wherever it is, to put this kind of talent, staff and funds into a project. I think in that way we can have this cooperative Federal-State program where we might be helpful. Let's see how the results have

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come out.

Now a word about the procedure governing the conduct of the conference. The conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. At the conclusion of such statements, the conferees will be given an opportunity to comment or ask questions.

The members of the audience will not have this opportunity. I suggest you save this for your statement, because unless we do it in this way, we will have a mass meeting, and probably will be here until the next session of the legislature. You wouldn't want that.

However, the procedure that I have outlined has proven effective in the past in developing a clear statement of the problem and in reaching agreements on equitable solutions.

We have as a guiding principle here the notion that we will give everybody who wants to say something and feels he has something to contribute to this, an opportunity to make his position clear.

At the end of all statements, we will have a

Opening Statement - Mr. Stein

discussion among the conferees and try to arrive at agreement on the facts of the situation. Then we will attempt to reconvene here and summarize the conference orally.

Under the Federal law, the Secretary of Health, Education, and Welfare is required, at the conclusion of the conference -- and the way our law reads now, this probably should read at this point the Secretary of the Interior -- to prepare a summary of it which will be sent to all the conferees. The summary, according to law, must include the following:

1. Occurrence of pollution in navigable waters subject to abatement under the Federal Act;
2. Adequacy of measures taken toward abatement of pollution; and
3. Nature of delays, if any, being encountered in abating the pollution.

I suggest that our conference discussions be directed toward these ends.

Subsequent to the conference, the Secretary of Health, Education, and Welfare is required to make recommendations for remedial action if such recommendations are indicated.

A record and verbatim transcript will be made

Opening Statement - Mr. Stein

of the conference by Mr. Al Zimmer. Mr. Zimmer is making this transcript for the purpose of aiding us in preparing a summary, and also providing a complete record of what is said here. We will make copies of the summary and transcript available to the Colorado State Department of Public Health. We have found that, generally, for the purpose of maintaining relationships within a State, that the people who wish transcripts should request them through their State agency, rather than come directly to the Federal Government. The reason for this is that we would prefer that the people who are interested in the problem follow their normal relations in dealing with State agencies rather than the Federal Government on these matters when the conference has been concluded. This has worked successfully in the past, and we will be most happy to make this material available to the State for distribution. From past experience, we have noted it takes three to six months to get the transcript printed.

I would suggest that all speakers and participants, other than the conferees, making statements, come to the lectern and identify themselves for the purpose of the record.

At this point, we would like to call on Mr. Lester Klashman for the Federal Government.

L. M. Klashman

STATEMENT OF LESTER M. KLASHMAN,
CONFEREES AND REGIONAL PROGRAM
DIRECTOR, REGION VIII, WATER POLLU-
TION CONTROL ADMINISTRATION, DENVER,
COLORADO

MR. KLASHMAN: Thank you, Mr. Stein.

We are very pleased to be here today to participate in this conference with you, Mr. Stein, Mr. Eckles and Dr. Cleere.

I would like to open our Federal Water Pollution Control Administration presentation by introducing some of our colleagues who are here attending this conference.

Karlo W. Nasi, who is our Regional Health Director for the Public Health Service in this Region VIII.

Mr. Hayse H. Black, who is our Industrial Waste Consultant.

Mr. Frank W. Kittrell, who is one of our top consultants.

Mr. Frank Rainwater from our Washington office.

Mr. Young and Mr. Blomgren are here from our Region VI office.

L. M. Klashman

We have a number of Federal agencies represented here, two of which are planning to make statements, Mr. H. P. Dugan, Regional Director of the Bureau of Reclamation. I am glad to see you, Mr. Dugan. We also have Mr. Robert Foster of the Fitzsimons General Hospital.

There are a number of other agencies represented here who I understand do not plan to make statements. If I am wrong, I wish you would let Mrs. Wilson at the registration desk know so that we can schedule you this afternoon.

Mr. William Anderson from the Soil Conservation Service.

Mr. Joseph Slizeski from the Corps of Engineers.

Mr. Paul Applegate from the Bureau of Land Management.

Mr. Robert Geehan from the Bureau of Mines.

Mr. John Fischer from the Bureau of Outdoor Recreation.

Dr. Glen Crabtree from the Bureau of Sports Fisheries and Wildlife.

Mr. Phillip Sharpe, also from that agency in Albuquerque.

Mr. Robert Brennan of the Geological Survey.

L. M. Klashman

Mr. James L. Ayers, National Park Service.

Mr. L. M. Grow from the Rocky Flats plant of the United States Atomic Energy Commission.

Dr. Gaon from the Rocky Mountain Arsenal is also here.

Mr. George F. Donnelly is also here from the Rocky Mountain Arsenal.

Mr. K. L. Kollar from the Department of Commerce.

And Mr. Feters from the United States Food and Drug Administration.

In our presentation, which will be made by members of the South Platte Project staff, there will be a number of terms used which may be unfamiliar to some of you.

When you came in, you were given a hand-out which contains some of these definitions, and I would just like to run through these briefly for you.

Biochemical oxygen demand abbreviated as BOD and analyzed as 5-day 20° C BOD as a measure of the oxygen demand of sewage and industrial wastes. BOD in the stream is a measure of oxygen used by living organisms in decomposing these wastes. Total suspended solids are

L. M. Klashman

solids found in waste water or in the stream which can be removed by filtration. The origin of suspended matter may be man-made wastes or natural sources such as silt from erosion.

Population equivalents, which sometimes are referred to as P.E., describe the polluttional effect of various waste discharges in terms of a corresponding effect of discharging raw sewage from an equivalent number of human population. Each P.E. represents the waste contributed by one person in a single day.

Primary treatment is the removal of settleable solids from sewage and industrial wastes. Units of a primary sewage treatment plant consist of screens, grit removal chambers, settling tanks, sludge digestors and sludge drying beds, and may include chlorination facilities. Primary treatment plants generally remove 25 to 35 percent of the BOD and 45 to 65 percent of the total suspended matter. If operated properly, it will remove all of the settleable solids.

In secondary treatment plants primary treatment is followed by biological methods to remove additional organic wastes. Units of a secondary treatment plant comprise, in addition to primary treatment, trickling

L. M. Klashman

filters or activated sludge basins, final settling of wastes, and should include chlorination facilities. Secondary treatment plants generally remove from wastes 80 to 95 percent of the BOD and suspended matter. In this report that we will present today, all data in the presentation are average or mean values except for bacterial densities. Bacteria are represented by median values obtained from the collected data.

I should now like to introduce Mr. Martin Bauer, who is the Project Director of our South Platte Project, who will direct the presentation which the Project is to make.

Thank you.

MR. STEIN: Thank you.

Before you get started, Mr. Bauer, I think we can see by the outline about how much time will be required for the conference. The way it looks now, it probably will take two days -- today and tomorrow.

Today mostly we will have official presentations of the Federal agencies and other official agencies, and tomorrow we will have other participants making their statements.

Then, hopefully, the conferees will be able

to get together and we will be able to make an announcement.

So that you can be governed accordingly, we expect to recess for lunch between twelve and two.

As you can note, there will be some technical terms here, from Mr. Klashman's presentation.

There is a real peculiarity about this field, and I guess, since the nature of the subject is such that it is dealing with waste and sewage and so forth, the terminology tends to be the most antiseptic you have ever heard.

Will you go on, Mr. Bauer?

M. A. Bauer

STATEMENT OF MARTIN A. BAUER,
DIRECTOR, SOUTH PLATTE RIVER BASIN
PROJECT, REGION VIII, WATER POLLU-
TION CONTROL ADMINISTRATION, UNITED
STATES PUBLIC HEALTH SERVICE, DENVER,
COLORADO

MR. BAUER: Mr. Chairman, Mr. Eckles,
conferees, ladies and gentlemen:

The following presentation is a summary of
a full report with two appendices, A and B.

Mr. Chairman, we request that this report
be submitted for the record.

MR. STEIN: The report will be included in
the record as if read, in its entirety, without objection.

MR. BAUER: Thank you, sir.

In addition, we request four additional
separate reports be submitted to the record also. These
four separate reports are entitled:

1. "Significant Vector Problems in the
South Platte River Basin."
2. "Municipal Waste Report, Metropolitan
Denver Area, South Platte River Basin."

M. A. Bauer

3. "Ground-water Pollution in the South Platte River Valley between Denver and Brighton, Colorado."

4. "Barr Lake and its Odor Relationships."

MR. STEIN: Without objection, this will also be done. This will be included in the record as if read.

MR. BAUER: Thank you, Mr. Chairman.

Copies of the full report and the four separate reports will be available at this conference.

(The reports referred to are contained in the Appendices of the Conference Document)

REPORT TO THE SECOND SESSION OF THE
CONFERENCE IN THE MATTER OF POLLUTION
OF THE SOUTH PLATTE RIVER BASIN

U. S. DEPARTMENT OF HEALTH, EDUCATION,
AND WELFARE, FEDERAL WATER POLLUTION
CONTROL ADMINISTRATION, SOUTH PLATTE
RIVER BASIN PROJECT

APRIL 27, 1966

M. A. Bauer

MR. BAUER: The South Platte River originates on the east side of the Continental Divide in central Colorado, flows northeast across the State into Nebraska, where it joins the North Platte River to form the Platte, a tributary of the Missouri River. The total drainage area is approximately 24,300 square miles, of which 19,450 square miles are within the State of Colorado.

The principal present water uses in the South Platte River Basin are agricultural irrigation and industrial water supply. If water quality is considerably improved, the waters of the South Platte River can be used for municipal water supply, recreation, including water-contact sports, establishment of a warm-water fishery and the necessary aquatic life to support fish, wildlife preservation, and esthetic enjoyment in addition to the present uses of agricultural irrigation and industrial uses.

The pattern of water use is expected to continuously change from agriculture to higher uses with the expanding population, the influx of industry, and the demand by both residents and visitors for adequate recreational facilities.

Based on the present interferences with water uses resulting from discharges of untreated and inadequately

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treated municipal and industrial wastes and the future needs of the area, specific pollution abatement measures must be provided. However, a high degree of treatment of wastes alone cannot at all times provide the water quality that is necessary to support these legitimate and beneficial uses. The withdrawals from the streams for irrigation, particularly during periods of low flow, in many instances does not permit sufficient water in the streams to provide the necessary dilution of treated waste effluent. Both an effective waste abatement program, together with flow augmentation, are necessary to achieve satisfactory water quality in the South Platte River Basin.

The Federal Water Pollution Control Act provides in Section 3(b)(1):

"In the survey or planning of any reservoir by the Corps of Engineers, Bureau of Reclamation, or other Federal agency, consideration shall be given to inclusion of storage for regulation of streamflow for the purpose of water quality control, except that any such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling waste at the source."

Augmentation flows for the upper and middle

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areas of the South Platte River can be made available in the future from either the proposed Chatfield or Two Forks Project above Denver. In the middle and lower portions of the South Platte River the necessary flow augmentation can be made available directly from the proposed Narrows Project and from exchanged waters obtained from a number of sources. The flows necessary for the tributaries could be made available from appropriate storage reservoirs when they are constructed. Such sources would involve projects proposed in the future, or might involve the purchase of the existing water rights by the State.

The first major study area of this report is termed "Denver Metropolitan Area."

The Denver Metropolitan Area covers that area bounded by the City of Brighton to the north, the City of Aurora and Cherry Creek Reservoir to the east, the Municipality of Littleton to the south, and the Town of Evergreen and the City of Golden to the west.

As a result of discharges of raw and inadequately treated wastes in the Denver Metropolitan Area, the waters of the South Platte River and its tributaries in and below this area are grossly polluted, and significant contamination exists in portions of the shallow groundwater aquifer.

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Five municipal treatment plants serving 70 percent of the sewered population provide only primary treatment. Eight of the remaining 21 sewage treatment works are receiving loads greater than their design capabilities. Further, 18 of these municipal sewage treatment plants either have no facilities for disinfection of wastes, or are not adequately utilizing the existing facilities.

There are many types of industry located in the Denver Metropolitan Area. Seventy-five percent of the industrial waste loading in Denver is discharged to municipal treatment plants. Most of the remaining industrial wastes are discharged without proper treatment to the streams through storm sewers or individual outfalls.

Both the sewage and industrial waste discharges to the South Platte River and its tributaries in the Denver Metropolitan Area contain a variety of obnoxious constituents which damage water quality and restrict its use for most legitimate and beneficial uses. These effects persist a considerable distance below Denver.

Project findings show that:

- 1) Coliform densities greatly exceed all commonly accepted standards for recreational use in

M. A. Bauer

almost all reaches of the South Platte River and its tributaries and presents a health hazard to those persons coming in contact with the waters;

2) oxygen demanding wastes have caused low dissolved oxygen levels in many reaches of the South Platte River below Denver, causing near septic conditions in the stream to the detriment of fish and other aquatic life;

3) suspended and settleable solids form sludge deposits in the river which have destroyed desirable aquatic plants and animals and create sight and odor nuisance conditions which preclude use or development of riverside recreational areas; and

4) pollution of the South Platte River has affected ground-water supplies and has thus created a hazard to health.

The second major study area of this report is termed "Middle and Lower Basin."

This area encompasses the South Platte River from the City of Brighton to the Colorado-Nebraska State line and its tributaries, the St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River.

Pollution in this area from municipal and

M. A. Bauer

industrial wastes has caused significant problems. As a result of municipal and industrial waste effluents reaching Barr Lake, extreme odor nuisance conditions have been reported in the spring and fall of the year. Feedlot operations contribute high bacterial concentrations to the waters in the South Platte River Basin, and have created sight and odor nuisances along the banks of the stream.

Organic pollution of the South Platte River and its tributaries has created conditions ideal for the breeding of mosquitoes, rats and flies, which can transmit diseases to humans such as the plague, encephalitis, and a wide range of enteric diseases.

Wastes from the beet sugar processing industry contribute heavily to the gross pollution of the Middle and Lower South Platte River Basin. This pollution interferes with most legitimate and beneficial uses of the river and its tributaries.

Municipal and industrial wastes discharged to the waters of the South Platte River and its tributaries within the State of Colorado endanger the health or welfare of persons in this State. This pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act, as amended.

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To protect and preserve the waters of the South Platte River and its tributaries within the State of Colorado for present and future legitimate and beneficial water uses, the following water quality objectives have been developed:

1. In the mainstem South Platte River from just above the City of Littleton to the discharge of Metropolitan Denver Sewage Disposal District No. 1 treatment facility; in Bear Creek from the Town of Evergreen to its mouth; and in Cherry Creek from the Cherry Creek Reservoir to its mouth --
 - a. The dissolved oxygen (DO) content be maintained at not less than 5 mg/l;
 - b. The 5-day 20°C BOD level not be allowed to exceed 10 mg/l; and
 - c. The total and fecal coliform levels not to exceed 2,400 and 500 coliform bacteria per 100 ml, respectively.
2. In the mainstem South Platte River from just below the discharge of Metropolitan Denver Sewage Disposal District No. 1 treatment facilities to just above the discharge from the Great Western Sugar Company in the City of Brighton; all of

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Sand Creek, and in Clear Creek from the City of Golden to its mouth --

- a. The dissolved oxygen (DO) content be maintained at not less than 4 mg/l;
 - b. The 5-day 20°C BOD level not be allowed to exceed 20 mg/l; and
 - c. The total and fecal coliform levels not to exceed 5,000 and 1,000 coliform bacteria per 100 ml, respectively.
3. In the mainstem South Platte River from just below the discharge from the Great Western Sugar Company mill in the City of Brighton to the Colorado-Nebraska State line; in the St. Vrain Creek from Longmont to its mouth; in the Big Thompson River from Loveland to its mouth; in the Little Thompson River from Johnstown to the stream mouth; and in the Cache la Poudre River from Windsor to the stream mouth --
- a. The dissolved oxygen (DO) content be maintained at no less than 4 mg/l;
 - b. The 5-day, 20°C BOD level not be allowed to exceed 15 mg/l; and
 - c. The total and fecal coliform levels not to

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exceed 5,000 and 1,000 coliform bacteria per 100 ml, respectively.

In order that the allowable water quality objectives not be exceeded, specific recommendations and time schedules have been developed for individual sources of waste in the Denver Metropolitan Area and in the Middle and Lower Basin areas for feedlot operations and for the beet sugar industry. Specific recommendations have not yet been developed for the remaining municipal and industrial wastes in the Middle and Lower Basin areas, but this will be completed within the next nine months. Consistent with the allowable water quality objectives, it is expected that these municipalities and industries will be required to treat their raw wastes with an efficiency in the area of 90 percent.

Mr. Chairman, at this point I would like to introduce Mr. E. B. Fitzpatrick, Chief of Pollution Control, who will present Project findings in the first major study area, the Denver Metropolitan Area.

Mr. Fitzpatrick.

MR. STEIN: Thank you very much, Mr. Bauer.

As some of you know, I am not much for introductions of people, but here is one I think we are going to have to do.

We have our sister State representative who just walked in, the man in charge of their program, Mr. Art Williamson.

Mr. Williamson, will you stand up? You can see he is from Wyoming.

The reason I call attention with particularity to Mr. Williamson is that we were through this on the North Platte River, and now we are on the South Platte. I am happy to report that we have done something in the North Platte. Of particular interest is that they had the same kind of wastes in large measure, municipal wastes and sugar beet mill wastes. We now have trout in the North Platte River.

Art, I hope we can do as well here.

By the way, I don't want to mislead you. I think your water is too warm for trout, but let's see if we can do something commensurate.

This is a pollution control job that has been completed, and I think that river is being used fairly extensively for recreation now.

Will you continue, Mr. Fitzpatrick, please?

MR. FITZPATRICK: Yes, sir.

E. V.. Fitzpatrick

STATEMENT OF EDWARD V. FITZPATRICK,
CHIEF, POLLUTION CONTROL SECTION,
SOUTH PLATTE RIVER BASIN PROJECT,
WATER POLLUTION CONTROL ADMINISTRA-
TION, UNITED STATES DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE,
DENVER, COLORADO

MR. FITZPATRICK: Mr. Chairman, Mr. Eckles,
Conferees, ladies and gentlemen:

DENVER METROPOLITAN AREA

Municipal Waste Discharges

Treatment facilities are provided by 7 sanitary districts, 14 municipalities, and 5 institutions. The major treatment works is the Denver Northside plant, with an average flow of about 72 mgd, serving an estimated 600,000 persons. The remaining 25 sewage treatment plants serve about 354,000 persons. On the basis of these data, municipal wastes for about 95 percent of the population of the Metropolitan Area receive treatment at these 26

E. V. Fitzpatrick

plants. The remainder of the population, or 46,000 persons, is served by septic tanks or similar facilities. It is estimated that 40 percent of overall loading to Metropolitan Area sewage treatment plants is from industrial operations. The overall reduction of 5-day, 20°C BOD by treatment is about 50 percent, while the overall reduction of total suspended solids is about 75 percent. Five municipal sewage treatment plants serving about 70 percent of the sewer population provide only primary treatment. Eight municipal sewage treatment plants, which have facilities for secondary treatment, are operating at less than 80 percent efficiency for removal of BOD. These 8 plants, and 2 additional facilities, are also removing less than 80 percent of total suspended solids. Plants designed for secondary treatment are considered capable of removing at least 80 percent of the BOD and total suspended solids. The treatment efficiency of the municipal sewage treatment plants, including both primary and secondary treatment, is summarized as follows:

<u>Treatment Efficiency</u>	<u>Number of Plants</u>	<u>Percent of Sewered Population</u>
less than 80% BOD removal	13	83
less than 80% TSS removal	15	90

E. V. Fitzpatrick

Eight secondary plants are overloaded since average daily flows are in excess of the designed plant capacity. The large numbers of total and fecal coliform in the streams result from the lack of disinfection facilities or insufficient use of existing facilities.

The daily loading to the Basin streams from municipal sewage treatment plant effluents from the Denver Metropolitan Area is estimated at 67 tons of BOD and 43 tons of total suspended solids. The principal source of municipal waste loading is the Denver Northside plant, which discharges 53 tons of BOD and 29 tons of total suspended solids to the South Platte River daily. About 10 tons of BOD and 9 tons of total suspended solids are discharged daily into Clear Creek by 9 municipal plants. More detailed information is contained in a Project report entitled "Municipal Waste Treatment, Metropolitan Denver Area," previously submitted for the record and available at this conference.

Industrial Waste Discharges

It is estimated that 75 percent of all industrial waste loading is discharged to municipal sewage treatment plants. The remainder of industrial and/or commercial

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wastes is discharged to the streams through storm sewers and individual outfalls.

A total of 507 outfalls was found in addition to municipal sewage treatment plant discharges. Of this number, 472 outfalls are located within the City and County of Denver. Of the 507 outfalls, 103 were flowing during periods of dry weather and were sampled. Forty-four flowing outfalls are associated with identified industries.

Major storm sewer discharges within the City and County of Denver account for 12 flowing outfalls and discharge wastes from a variety of industrial and commercial operations, including filling stations, laundries, warehouses, and similar establishments.

There are 10 flowing outfalls which are in the vicinity of truck-washing and maintenance operations and which contain excessive amounts of oil and ABS. Nine of these outfalls are located in Denver and one in Adams County.

There are 37 additional flowing outfalls, 31 of which are located in Denver, that contribute the remainder of waste loading to the streams. The origin and loading of waste discharges in the Denver Metropolitan area are summarized as follows:

Please refer to the second page of your hand-out material.

E. V. Fitzpatrick

Twenty-three outfalls from municipal sewage treatment plants have a BOD loading of 67 tons per day and represent a BOD loading equivalent to 804,000 persons.

Forty-four outfalls from identified industrial wastes have a BOD loading of 6.4 tons per day, a total suspended solids loading of 13.8 tons per day, and represent a BOD loading equivalent to 77,000 persons.

Twelve outfalls from major storm sewers have a BOD loading of 6.9 tons per day, a total suspended solids loading of 11.2 tons per day, and represent a BOD loading equivalent to 83,000 persons.

MR. STEIN: Mr. Fitzpatrick, will you pardon me for just one second?

We should have made an announcement about the charts in the hand-outs. I think the charts in the hand-outs are designed for the technical people in the audience. I know they are very technical, but this is the kind of presentation that our staff believes would be important for them.

For those people in the audience who do not have this technical background, you may just want to listen and not attempt to follow these charts.

These are not the kinds of charts that simplify things in the sense of a TV commercial, where you get acid

E. V. Fitzpatrick

dripping down in the stomach, or something, so if you are finding the charts fairly difficult, it is suggested that you may get more out of the presentation just by listening than attempting to go through the charts.

Will you continue, Mr. Fitzpatrick? Thank you.

MR. FITZPATRICK: Thank you.

Ten outfalls from truck washing operations have a BOD loading of 1.1 tons per day, a total suspended solids loading of 1.3 tons per day, and represent a BOD loading equivalent to 13,000 persons.

Thirty-seven other outfalls have a BOD loading of 0.9 tons per day, a total suspended solids loading of 3.5 tons per day, and represent a BOD loading equivalent to 11,000 persons.

The population equivalent for all known waste discharges in the Denver Metropolitan Area amounts to 990,000 persons for BOD loading and 730,000 persons for total suspended solids loading. In Appendix A of the full report, previously submitted for the record, the location and a summary of the Project sampling data are given for each of the 126 flowing waste outfalls in the Metropolitan Area.

E. V. Fitzpatrick

Municipal waste treatment plants, the Omaha, Nebraska plant particularly, have experienced considerable difficulty in handling paunch content wastes. A Project report on packing wastes in the Denver Metropolitan Area is given in Appendix B of the full report previously submitted for the record.

It is estimated that 125 tons of paunch contents are handled each operating day at the 13 slaughterhouses in the Denver Metropolitan Area. Of the total, it is estimated that 60 tons are discharged to sanitary sewers. The Denver Northside plant receives about 56 tons and the North Washington District plant receives 4 tons. Both of these plants are affiliated with the Metropolitan Denver Sewage Disposal District No. 1 which has regulations prohibiting the discharge of paunch contents. The remainder of the paunch contents is removed by in-plant treatment at the slaughterhouses, collected and used by individual farmers and fertilizer operations.

Metropolitan Denver Sewage Disposal District No. 1

The Metropolitan Denver Sewage Disposal District No. 1 sewage treatment plant (Metro District plant) is scheduled to commence operation prior to January 1, 1967.

A total of 48 municipalities and sanitary districts, representing about 75 percent of all persons living in the metropolitan area, will be served by the Metro District

E. V. Fitzpatrick

facility. The Denver Northside primary plant will operate in conjunction with the Metro District plant facility. Eight other member plants, now discharging directly to streams, will be connected to the Metro District plant. Five of these, equipped for secondary treatment, may continue to discharge portions of their effluents to the streams provided that State effluent standards are met.

The design of the Metro District plant has sufficient flexibility to allow for expansion of both primary and secondary treatment facilities in several stages. Denver Metro Engineers have estimated that expansion of the Metro District plant will be required for primary treatment by 1981 and for secondary treatment by 1982. If the Clear Creek secondary treatment plants are abandoned, these expansion dates are estimated, by the Denver Metro Engineers, to be 1979 for primary treatment and 1980 for secondary treatment.

Project estimates have been developed for flow, BOD, and total suspended solids loading in 1967 to both the Denver Northside and Metro District plants. These estimates are based on the present effluent loading of the treatment plants committed to MDSDD #1, and the additional waste loading to the Denver Northside and Metro District plants as a result of diverting industrial wastes now discharging directly to the streams into sanitary sewers.

E. V. Fitzpatrick

The 1967 loading estimated by the Project indicates that the Metro District primary treatment facilities are considered adequate for anticipated future increased loading. However, an examination of the Denver Northside primary treatment plant and the Metro District secondary treatment facilities shows that the estimated loading will be quite close to design capacity in 1967.

On this basis and the probability that the Clear Creek secondary treatment plants will cease to operate within a few years, it is likely that the expansion of secondary treatment facilities at the Metro District plant will be necessary much earlier than the anticipated date of 1980.

Stream Surveys in the Denver Metropolitan Area

Several water quality surveys were made to determine the impact of waste discharges from the Denver Metropolitan area. The study results are grouped as follows:

1. The four main tributary streams entering Denver -- Bear Creek, Cherry Creek, Clear Creek, and Sand Creek.
2. The South Platte River from Littleton to directly below the City and County of Denver.
3. The South Platte River from Denver extending downstream to Greeley.

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In addition to the chemical and bacteriological quality of the streams, biological surveys were also conducted for purposes of pollution assessment.

Bear Creek

Water quality studies were conducted on Bear Creek at four stations from Evergreen to the mouth, a distance of 22 miles. Chemical results for Bear Creek indicate relatively good water quality existed at all sampling points despite several waste discharges; dissolved oxygen was in excess of 8 mg/l, and 5-day BOD did not exceed 6 mg/l. These values are well within the allowable water quality objectives for Bear Creek. The observed coliform bacteria values in the lower stream approaches, at times exceeded the maximum allowable levels of 2400 total coliform per 100 ml, and 500 fecal coliform per 100 ml.

Results of the biological studies on Bear Creek show the presence of marginal water quality conditions for extended periods of time within the middle portion of the stream and the definite need to eliminate all improperly treated wastes.

Cherry Creek

Cherry Creek is dry most of the year directly below

E. V. Fitzpatrick

the Reservoir. However, after entering the Denver City limits, ground water inflow and outfall discharges provide steady streamflow.

Cherry Creek carried moderate amounts of mineral salts and significant coliform bacteria densities. Dissolved oxygen was in excess of 8 mg/l and 5-day BOD did not exceed 6 mg/l. Between Colorado Boulevard and the stream mouth, the BOD increase in the stream was 2200 population equivalent.

The biological studies undertaken for Cherry Creek indicate severe pollution was occurring in the lower stream. The entire bottom animal population consisted of pollution-tolerant organisms of which 90 percent or more were sludge-worms. The narrow spectrum and the large numbers of tolerant bottom organisms found indicated a high degree of stream pollution.

Clear Creek

Project surveys covered 22 miles of Clear Creek from Golden to the stream mouth.

Many diversions cause extremely low flow conditions in the lower stream during the summer months. The majority of the streamflow and the accompanying waste load is utilized by the various water users during the summer. As a consequence,

E. V. Fitzpatrick

small amounts of water and wastes enter the South Platte River. In the wintertime, there are minimal diversions and most of the waste load deposited into Clear Creek is discharged to the South Platte River. Water quality data were collected at four locations in September 1964 to define summertime conditions, and one location near the stream mouth was sampled from January to March 1965 to provide wintertime conditions.

Results of the September 1964 water quality study are shown in Figure 7 included in your handout.

(Figure 7 is as follows:)

CLEAR CREEK WATER QUALITY **September 21-26, 1964**

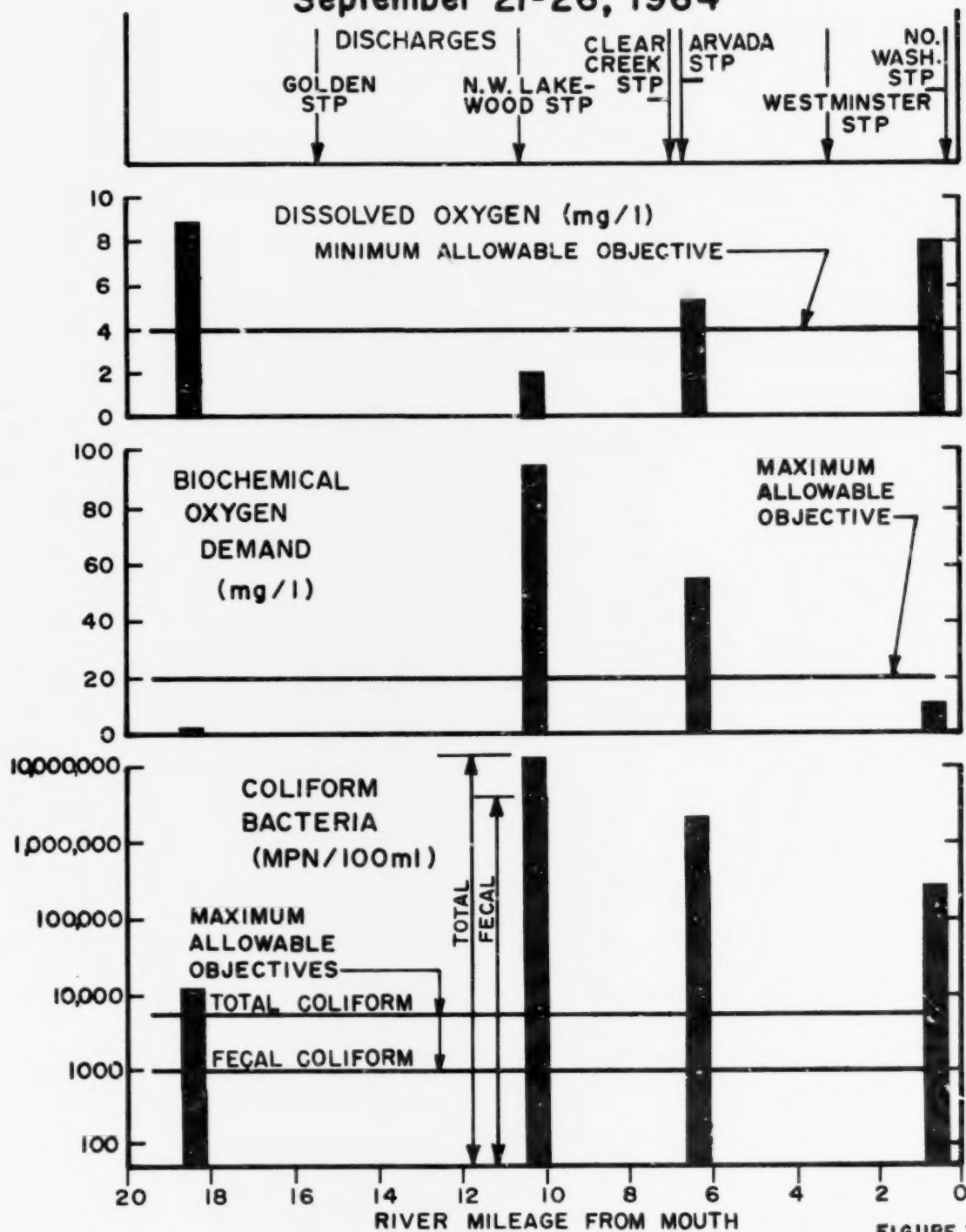


FIGURE 7

E. V. Fitzpatrick

Stream flow above Golden was 70 cfs and all water quality objectives were met except total coliform. Below the Northwest Lakewood Sewage Treatment Plant three sewage treatment plant outfalls flow in the stream was only 7.5 cfs, and comprised almost entirely of sewage effluent. Stream values at this point were 95 mg/l BOD, 1.8 mg/l dissolved oxygen, and 15,000,000 and 4,000,000 total and fecal coliform per 100 ml, respectively. Near the mouth of Clear Creek water quality was not considered important in September 1964, since there was only a bare trickle of water passing this point.

The September 1964 study shows large waste loads and very poor water quality in sections of Clear Creek where there are ample amounts of flowing water. The majority of the waste load was assumed by the various diversions taking water from the stream, part settled to the stream bottom as sludge banks, and part was removed by stream assimilation.

In January-March 1964 a large portion of the waste load from upstream sources remained in the stream and was carried to the South Platte River. At York Street the flow was 25 to 30 cfs; BOD from 56 to 82 mg/l; dissolved oxygen between 4.7 and 6.8 mg/l; total coliform from 2.8 to 3.3 million per 100 ml, and fecal coliform from 490,000 to 700,000 per 100 ml.

Clear Creek showed gross pollution at all points

E. V. Fitzpatrick

downstream of Kipling Street, a distance of 10.2 miles to the stream mouth. BOD values from Kipling Street downstream were up to five times the maximum allowable objectives and coliform bacteria values were up to 4,000 times the maximum allowable levels. During the wintertime, Clear Creek is a large contributor of waste load to the South Platte River, discharging approximately 87,000 population equivalent of waste to the main River.

Sand Creek

Sand Creek generally has little or no flow above Aurora. Below this point, the stream is largely comprised of municipal and industrial waste effluents, most of which are inadequately treated.

Project water quality surveys were carried out on Sand Creek in September 1964, and are illustrated in Figure 8, which was also included with your handout earlier.

(Figure 8 is as follows:)

SAND CREEK WATER QUALITY September 21-26, 1964

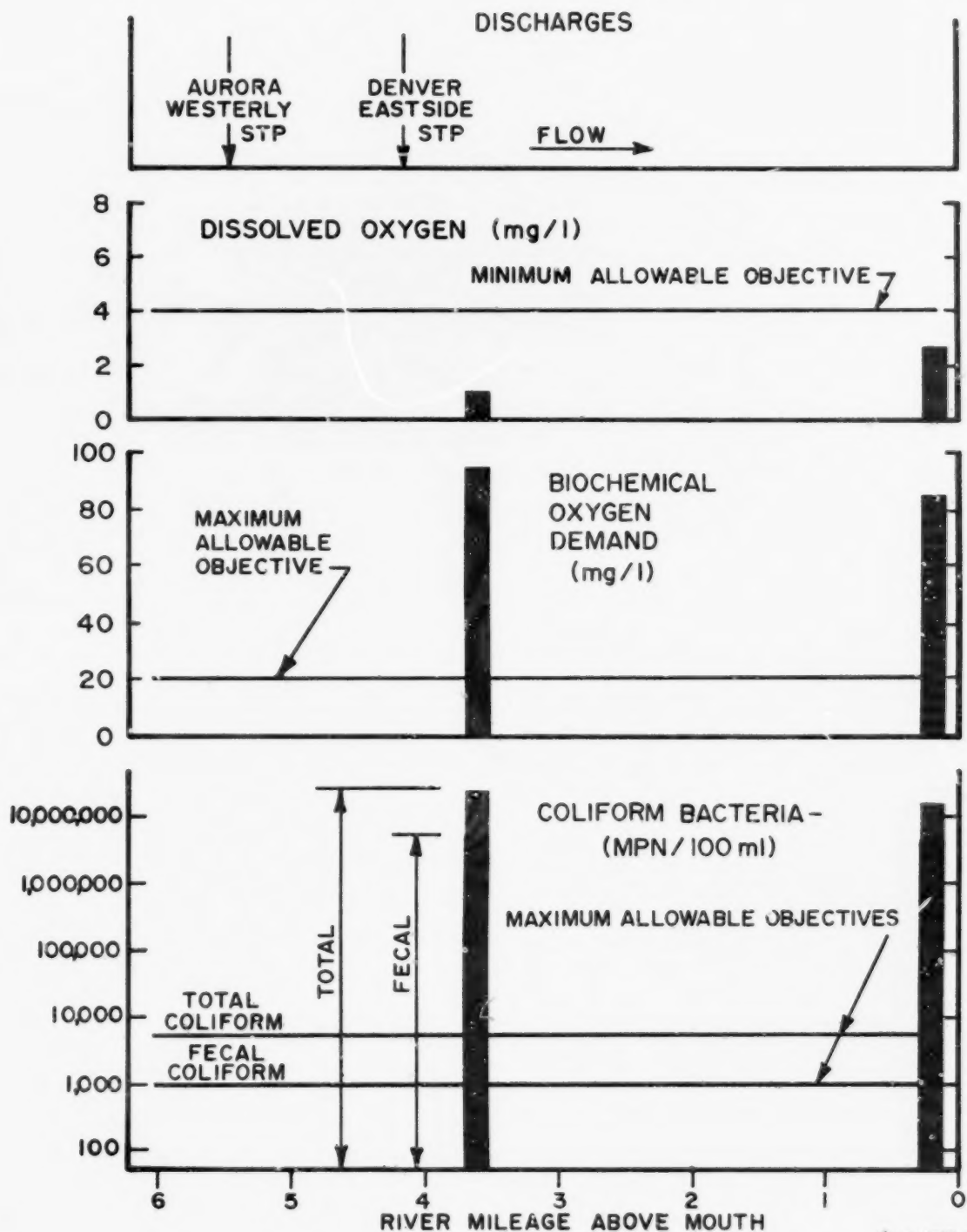


FIGURE 8

E. V. Fitzpatrick

The upstream sampling location below the Denver Eastside sewage treatment plant and Sand Creek at its mouth showed only one-quarter of the minimum allowable limit for dissolved oxygen, concentrations 5 times the maximum allowable limit for BOD, 1600 times the limit for total coliform, 5400 times the limit for fecal coliform, and only 1/4 of the minimum allowable limit for dissolved oxygen. These values are indicative of primary-treated sewage rather than stream waters, and furthermore, near septic or anaerobic conditions were present in the stream.

Survey results from September-October 1965 showed BOD values were up to 8 times the maximum allowable objectives and coliform bacteria were up to 4,500 times the maximum allowable levels.

About 70,000 P.E. of BOD and 300,000 P.E. of suspended solids were consistently discharged to the South Platte River during the 1964-1965 studies.

E. V. Fitzpatrick

MR. STEIN: Mr. Fitzpatrick, I wonder if I may interrupt here? I think this possibly is a good place for a ten-minute recess.

We will stand recessed for ten minutes.

(Whereupon a recess was had.)

MR. STEIN: May we come to order?

In order to answer two questions which have come up, one, as you can appreciate, we have a lot of numbers in this report.

By the way, I think so far this is a very excellent report. I suspect, though, that this is going to be the face of water pollution control in the future. If we are talking in terms of water pollution control and we are going to examine each stream separately, as I think we should and have to, and each industrial contribution and municipal contribution, we are going to have to talk in terms of numbers, and the new Federal standards will even emphasize that more. So this probably will be the face of water pollution control from here on in.

The other point is that the copies of this report will be available for distribution at the conclusion of the Federal presentation.

Mr. Fitzpatrick, will you continue?

MR. FITZPATRICK: Yes, sir.

E. V. Fitzpatrick

South Platte River - Littleton through Denver

The remainder of this section is devoted to the South Platte River. The results of 3 water quality surveys conducted since May 1964 and biological conditions on the South Platte River in the area between Littleton and the Cache la Poudre River will be discussed.

Results of a water quality survey of the main river from Littleton downstream to one mile below the Denver Northside sewage treatment plant was conducted in August 1964 and are illustrated in Figure 9, included in your hand-out.

(Figure 9 is as follows:)

QUALITY OF SOUTH PLATTE RIVER WATER Denver Metropolitan Area August 1964

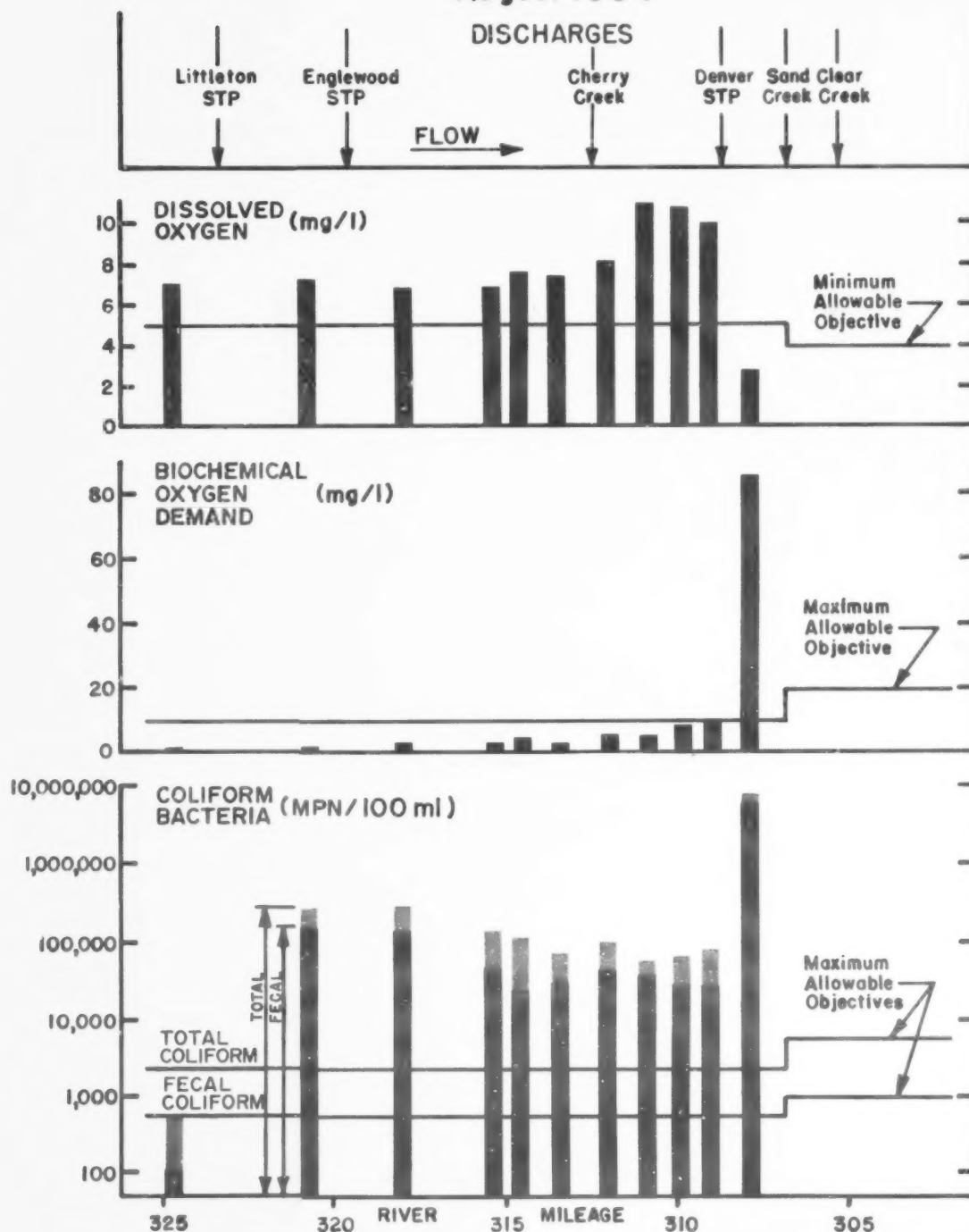


FIGURE 9

E. V. Fitzpatrick

MR. FITZPATRICK: Streamflows in the summertime through Denver are relatively high and during the August 1964 survey these flows approximated 140 cfs at the Denver 19th Street gauge. In this 17 miles of stream there are three municipal sewage treatment plants and more than 75 outfalls discharging waste material directly to the river. Other Project studies estimate the total waste loading entering this section of the South Platte River is 780,000 population equivalent, with 80 percent contributed by Denver Northside sewage treatment plant.

The August 1964 study shows satisfactory dissolved oxygen at all points above the Denver Northside sewage plant, but then a decrease from 11 mg/l directly above to 2.5 mg/l dissolved oxygen one mile below this plant. Five-day BOD in the river is within the maximum allowable objective of 10 mg/l between a point above Littleton and the Denver Northside plant. The impact of the Denver Northside treatment plant is shown by the farthest downstream sampling point with a concentration of 85 mg/l BOD in the river. Total coliform bacteria levels were low above Littleton, increased sharply below the Littleton and Englewood sewage treatment plants to around 300,000 per 100 ml, and then showed a gradual decline to about 75,000 per 100 ml above Cherry Creek. Total coliform levels ranged

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between 49,000 and 105,000 per 100 ml above the Denver Northside treatment plant. Below the plant, total coliform densities increased 100 times to the level of 8 million organisms per 100 ml. The fecal coliform pattern was the same as total coliform. Below the Northside treatment plant total coliform levels were 1,600 times greater than the maximum allowable objectives, and fecal coliform levels were 6,000 times greater than these objectives.

The quality of flowing waters in the South Platte River is affected by waste material settling to the stream bottom. Numerous sludge deposits occurred in many areas of the river downstream of Littleton through the City of Denver, and particularly below the Denver Northside treatment plant. Settling reduces the waste load carried in the flowing waters and gives the impression the stream is in better condition than is actually the case. Sludge deposits represent a definite liability which must be accounted for in determining the true condition of a stream. A significant portion of the load discharged in Denver settles to the river bottom and the water quality results given above and below must be viewed critically with this principle in mind.

Wintertime conditions in the South Platte River through Denver are represented by a water quality

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survey conducted from December 1964 through March 1965. The flow at the Denver gauge averaged about 50 cfs for the particular days of sampling. This study covered the river from Florida Avenue to 4 miles below the Denver Northside treatment plant. Results are illustrated in Figure 10, included in your hand-out.

(Figure 10 is as follows:)

QUALITY OF SOUTH PLATTE RIVER WATER Denver Metropolitan Area December 1964 - March 1965

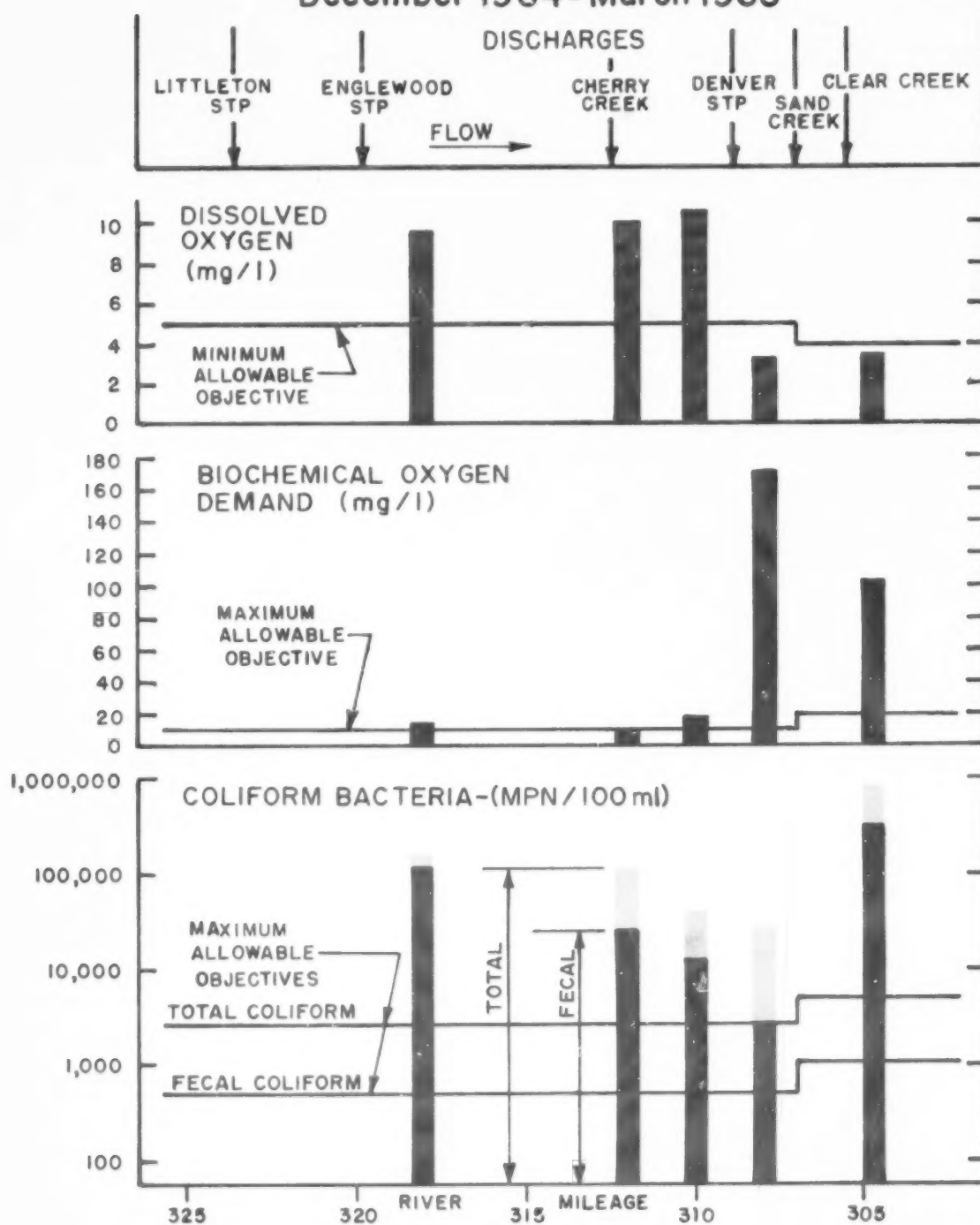


FIGURE 10

E. V. Fitzpatrick

MR. FITZPATRICK: The wintertime study shows essentially the same dissolved oxygen picture as August 1964. The BOD concentrations on the other hand were two to three times higher than corresponding values obtained during the summer period. Above the Denver Northside treatment plant, BOD content exceeded, at certain locations, the maximum allowable objective even though the majority of upstream waste load was settling to the river bottom. Directly below the Denver treatment plant, the average BOD concentration in the river was 170 mg/l, twice the summertime 1964 value noted for this same location. This was 17 times the maximum allowable BOD level. Coliform bacteria concentrations over the stream stretch were, in all cases, many times greater than the maximum allowable bacteria levels. These results show the water quality of South Platte River waters in the wintertime is, in many respects, worse than summertime.

South Platte River - Below Denver

A water quality study of October 7-10, 1965, covered the South Platte River from the 19th Street Denver gauge to one mile upstream of the Cache la Poudre River near Greeley. Total stream distance was 66 miles.

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Streamflow was 305 cfs at the Denver gauge and 1,185 cfs above the Cache la Poudre River. Irrigation canals were withdrawing relatively small amounts of water during this period and the majority of Denver Metropolitan waste load was carried a long distance downstream. Results of this study are illustrated in Figure 12, which is included with your hand-out.

(Figure 12 is as follows:)

QUALITY of SOUTH PLATTE RIVER WATER Denver to Greeley October 1965

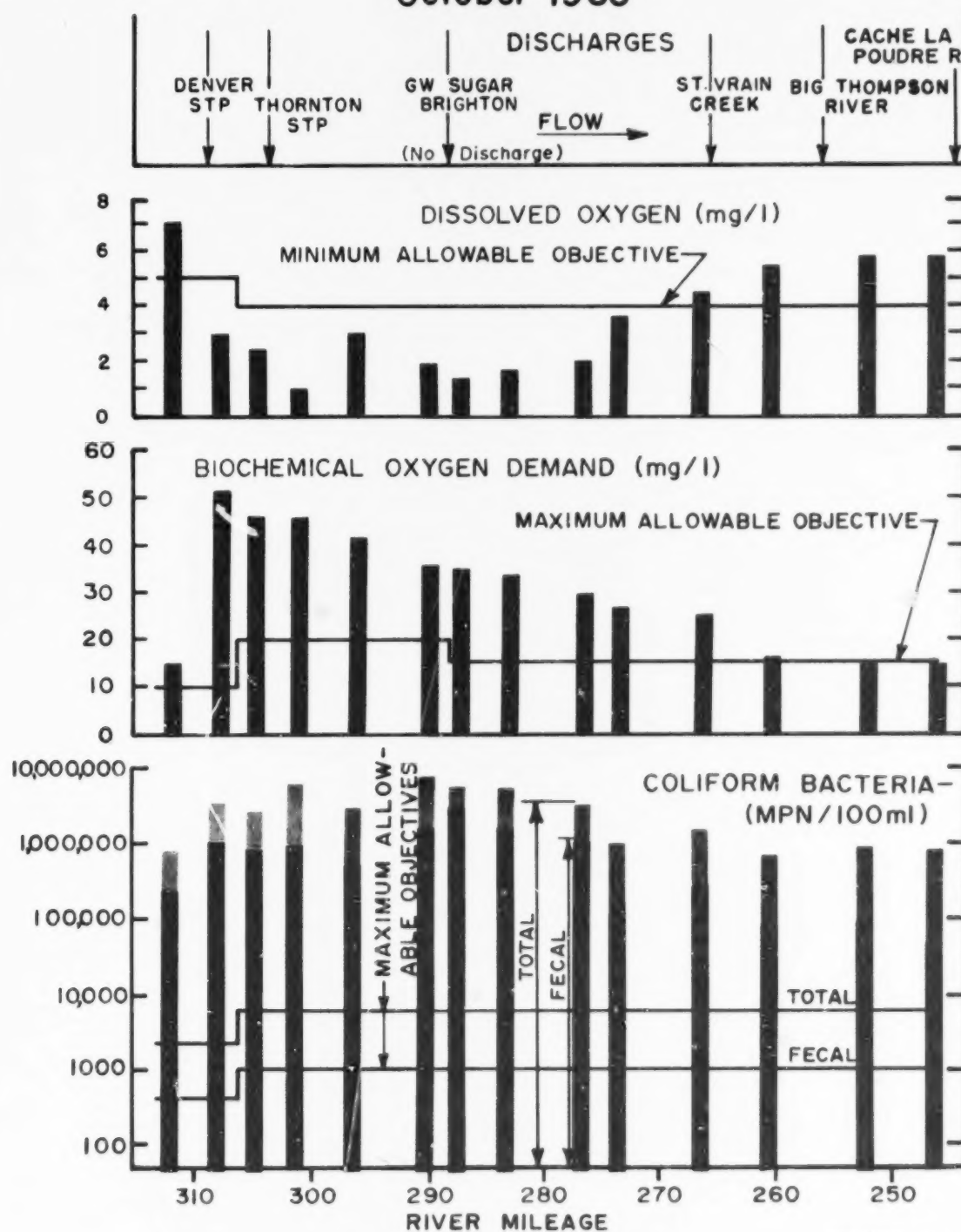


FIGURE 12

E. V. Fitzpatrick

MR. FITZPATRICK: Dissolved oxygen in October 1965 was reduced from 7.0 mg/l at 19th Street in Denver to an average value of only 1.0 mg/l eight miles below the City of Denver. The dissolved oxygen was below the minimum allowable stream objective of 4.0 mg/l for 39 miles below Denver.

The 5-day BOD in the river in October increased from 14 mg/l above the Northside treatment plant to 51 mg/l one mile below the plant. A total waste load of 800,000 P.E. was present in the river waters directly below the plant and calculations show that an additional 95,000 P.E. of the waste load was settling to the stream bottom between 19th Street and the station located one mile below the plant. Because of minimum diversions, the South Platte River above the Cache la Poudre still carried a waste load of 560,000 P.E., the majority of which originated from the Metropolitan Denver area. Greater streamflows in the downstream sections diluted the BOD concentrations in the river water. Nevertheless, BOD values over the entire 54 miles stretch of the river from Denver to Greeley were in excess of the maximum allowable objectives.

Total and fecal coliform bacteria reached maximum values of 8.6 and 3.2 million, respectively, per 100 ml in the area of Brighton. Very high coliform

E. V. Fitzpatrick

densities were found in the river waters at all locations. The bacteriological levels were still high at the last station above the Cache la Poudre, and South Platte River waters at this location contained 940,000 total coliform and 56,000 fecal coliform organism per 100 ml. The bacteriological quality of the South Platte River for the entire distance from Denver to Greeley was extremely poor.

Biological investigations were conducted in May 1964 and covered the South Platte River from above Littleton to Platteville, about 30 miles below Denver. Figure 13, included in your hand-out, shows the number of pollution-sensitive and pollution-tolerant forms of bottom organisms.

(Figure 13 is as follows:)

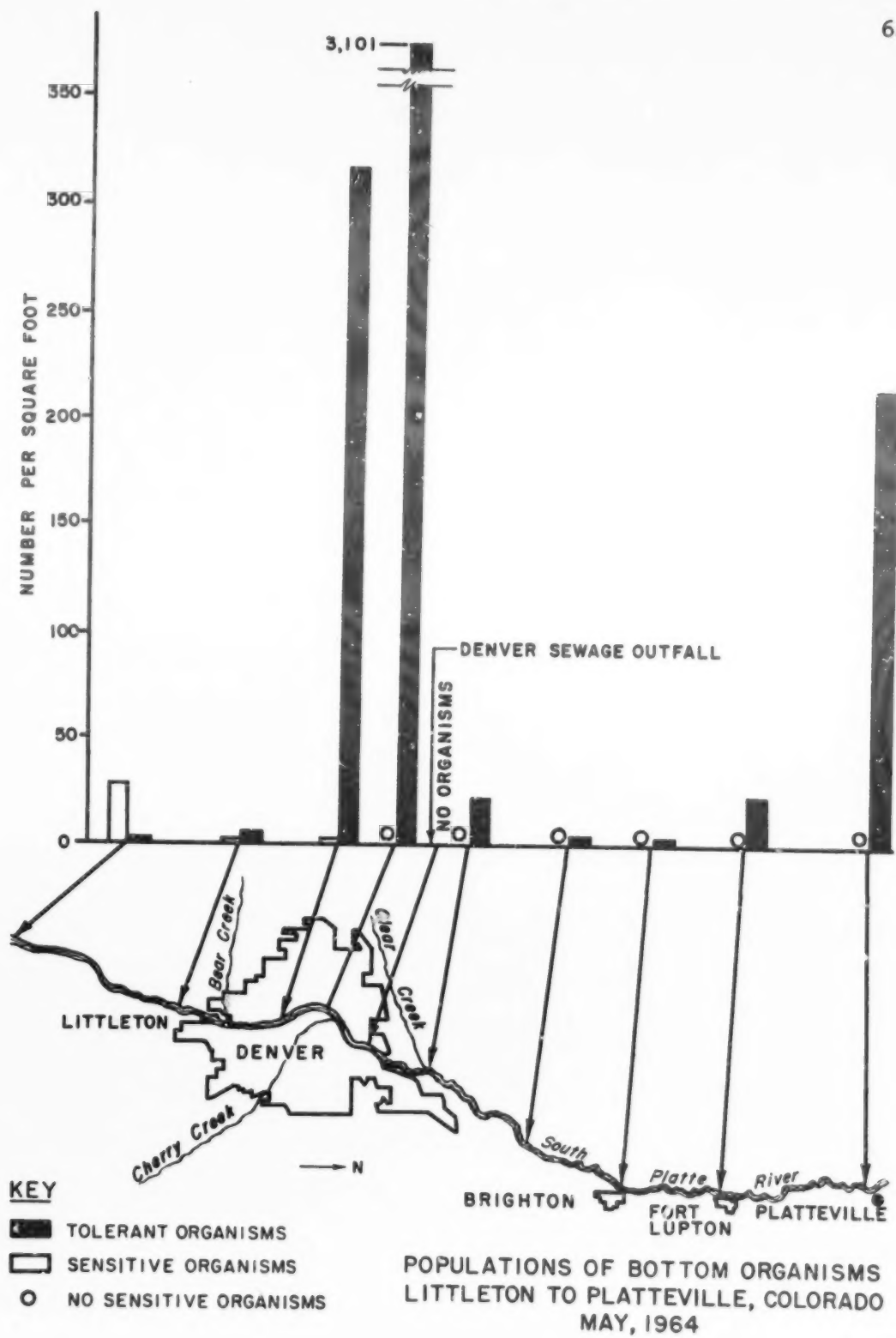


FIGURE 13

E. V. Fitzpatrick

MR. FITZPATRICK: The response of the biological community to progressively severe pollution is briefly described in stages as follows:

- 1) Clean streams produce a balanced biota including a broad spectrum of all organisms;
- 2) moderate pollution produces increasing numbers of tolerant species at the expense of the sensitive forms;
- 3) severe pollution creates large numbers of only one or two tolerant species and complete elimination of sensitive forms; and, finally
- 4) gross degradation eliminates all forms of biological life other than bacteria on the stream bottom.

The biological community above Littleton has a predominance of sensitive over tolerant organisms. Upon entering Littleton and Denver, the sensitive types diminish and the tolerant forms greatly increase until the situation exists immediately above Cherry Creek where no sensitive forms were present, and there were 3,100 tolerant organisms per square foot of river bottom. At Franklin Street, immediately below the Denver Northside plant, all forms of bottom life, other than bacteria, were completely eliminated.

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Tolerant organisms, particularly sludgeworms, did not become established until Platteville, and throughout this entire 30 miles of stream below Denver, no sensitive organisms were found. Biological recovery started around Platteville. One of the major deterrents to biological life is the abnormally large amounts of sludge deposits found on the bottom of the River, particularly below the Denver Northside treatment plant. Essentially, all settleable solids must be removed from the waste discharges for the elimination of this most undesirable problem.

Ground Water Studies

The Project undertook a program from May 1964 to March 1965 to determine sources and the extent of pollution in the water-bearing formations of the Denver Metropolitan Area. The Project report entitled, "Ground Water Pollution in the South Platte River Valley Between Denver and Brighton, Colorado," previously submitted for the record, is available at this conference.

The fresh water-bearing aquifers in the Denver Metropolitan Area consist principally of the bedrock formations and the overlying valley-fill deposits. Water wells located in the bedrock aquifers range from depths of between 100 and

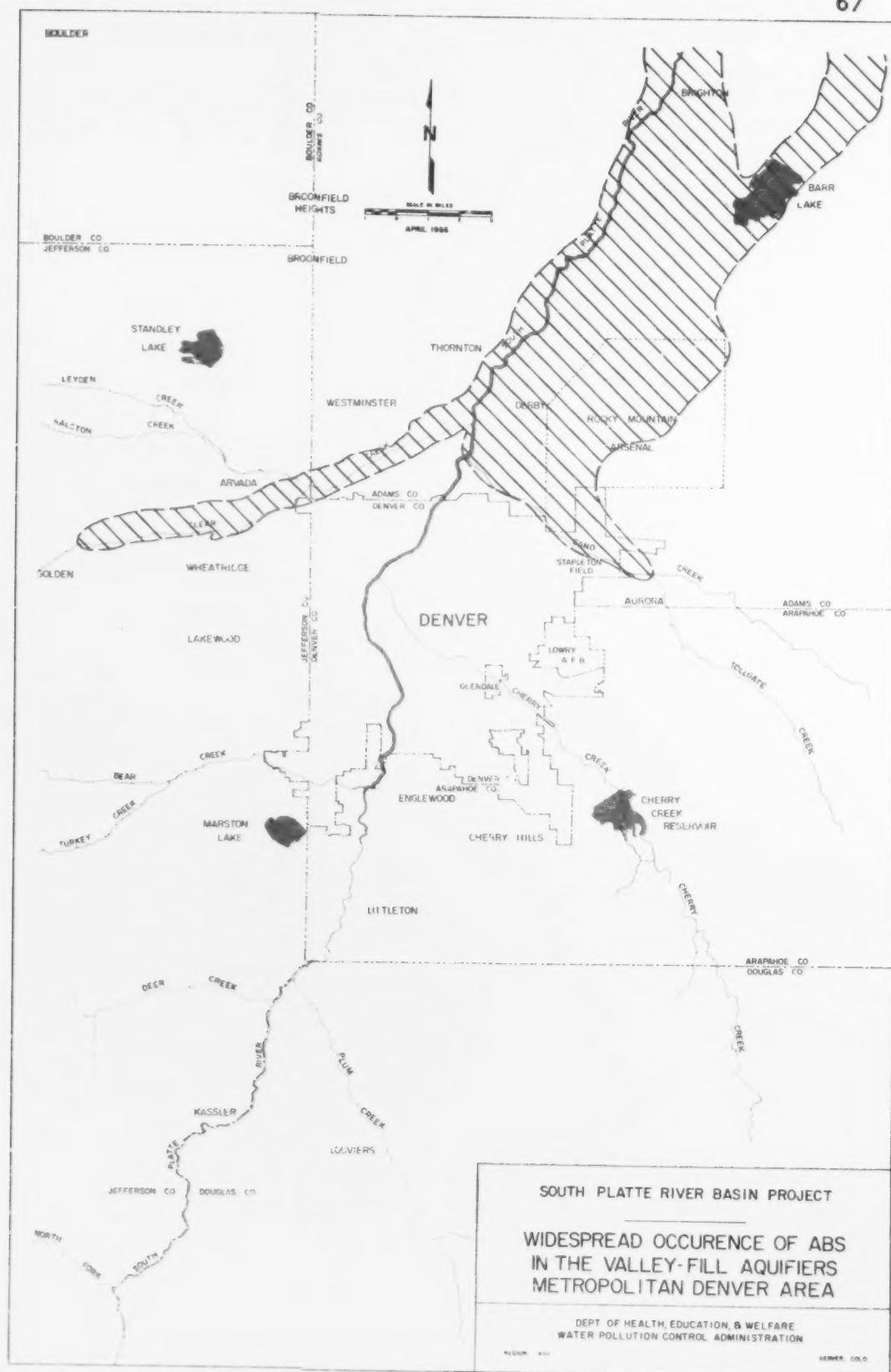
2000 feet below the land surface. Although water from these formations is usually considered to be of good quality, the low yield from these aquifers precludes any wide-scale use.

Over 3800 shallow wells currently withdraw water from the valley-fill aquifer in the Denver Metropolitan Area. Most of the large capacity wells are concentrated in the valleys of the South Platte River, Cherry Creek, Sand Creek, and Clear Creek. Approximately 850 wells supply water for irrigation; over 2,000 wells supply individual residences, 96 wells furnish part, or all, of the water delivered by 18 public water supply systems in the area, and the remaining wells are utilized for industrial and commercial purposes.

The valley-fill aquifers are very susceptible to pollution. Polluted water or other liquids discharged on much of the land surface in the area readily enter the shallow unconfined aquifers. Widespread pollution of the shallow aquifers has occurred in the valleys north of Denver; whereas localized instances of pollution have occurred in other parts of the Denver Metropolitan Area.

Contaminants found in the shallow aquifer during Project studies include alkyl benzene sulfonate (ABS), nitrates, oils, pesticides, herbicides, arsenic, and salts. As shown in Figure 14, included in your handout, widespread ABS pollution occurs north of Denver in the Valleys of the South Platte River, Sand Creek, and Clear Creek.

(Figure 14 is as follows:)



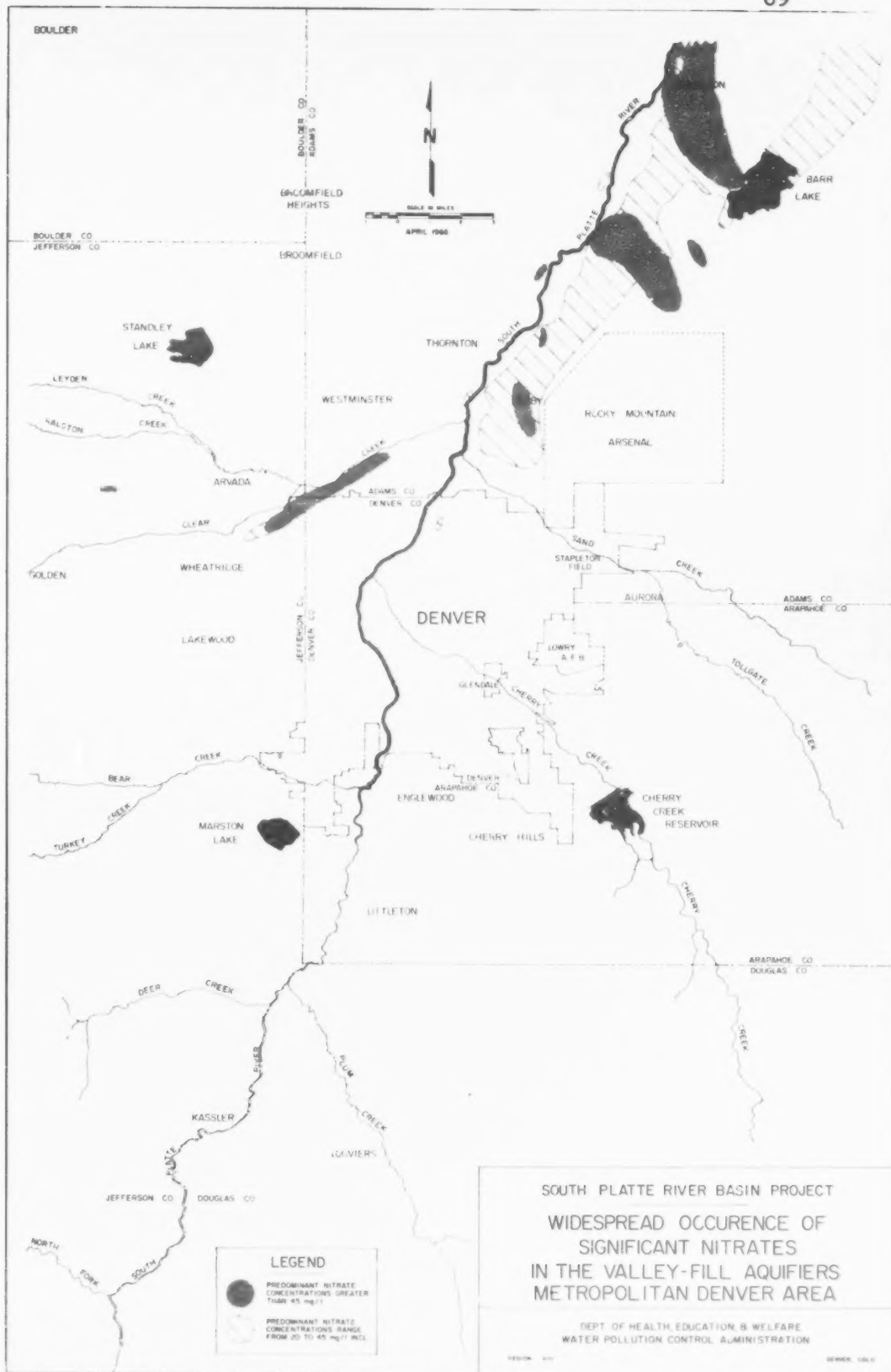
E. v. Fitzpatrick

Concentrations of ABS within the shaded area of this figure range from 0.1 to 1.0 mg/l. A large portion of the sewage-laden waters of Clear Creek and the South Platte River are diverted to irrigation ditches, and, in turn, enter the shallow aquifer. Values for ABS in excess of 0.5 mg/l, the recommended limits set forth in the USPHS Drinking Water Standards, were found in shallow well sources of public water supply systems operated by South Adams Water District and Town and Country Mutual Water Company.

An infiltration pond and well operated by Northwest Water Corporation are located near the confluence of Clear Creek and the South Platte River. Investigations of this public supply revealed ABS concentrations in the shallow pond and well were at the recommended limit of 0.5 mg/l set forth in the USPHS Drinking Water Standards.

As shown in Figure 15, included in your handout here, significant and often excessive nitrates occur in the shallow aquifers in the lowlands of Clear Creek Valley and the main South Platte River Valley north of Denver.

(Figure 15 is as follows:)



E. V. Fitzpatrick

The areas described by diagonal lines, show areas where nitrates ranged from 20 to 45 mg/l; while the solid zones indicate nitrate concentrations in excess of 45 mg/l, which is the USPHS Drinking Water recommended limit. The sources of nitrates are attributed to the use of water-soluble chemical fertilizers, sewage-laden recharge waters, and possibly feedlot operations. Two shallow wells owned by the South Adams Water and Sanitation District, and all wells supplying the City of Brighton yield waters containing nitrate concentrations in excess of 45 mg/l, and are considered dangerous when used for infant feeding.

Much of the shallow aquifer in lower Sand Creek Valley is contaminated by the seepage of petroleum wastes discharged into unlined settling ponds or directly into Sand Creek. Evidence of oil contamination in wells utilized by the Town and Country Mutual Water Company in Commerce City as a source of public water supply, were first detected in 1957. Samples from these wells in 1964 indicate that the situation has not changed.

In addition to public water supply, shallow wells for other uses within the critical areas are similarly affected.

The Rocky Mountain Arsenal contamination incident illustrates the widespread damage that can result from disposing of wastes to unlined ponds. During the period of

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1943-1955, chemical wastes at the Arsenal were conveyed in unlined ditches and retained in unlined holding ponds. Most of the wastes percolated directly into the shallow aquifer and moved slowly downgradient in a general northwesterly direction toward the South Platte River. The present area of ground-water contamination resulting from excessive chloride concentrations covers approximately 12 square miles. In portions of this affected area, additional contamination is found, including excessive concentrations of fluoride, arsenic, herbicides, and pesticides. Damages to crops and domestic and irrigation water supplies have occurred.

Withdrawals from the shallow aquifer should be carefully controlled near the present boundary of the contaminated zone in order to minimize further expansion of the contaminated zone.

It is evident that widespread pollution of the shallow, unconfined aquifers in the Denver Metropolitan Area has impaired the usefulness of large quantities of water for public supply and domestic purposes. It is expected that existing conditions will persist for many decades, even after sources of pollution have been eliminated.

Municipal Water Supplies

During the period June 1964 to December 1965, the

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Project conducted an investigation on quality of municipal water supplies in the Denver Metropolitan Area. The objective of this program was to determine to what extent, if any, pollution now present in the South Platte River, its tributaries, and the shallow ground-water aquifer might affect these sources of water.

No water quality problems are evident in the case of the water supplied by the Denver Water Board.

The remainder of the public water supplies from the Denver Metropolitan Area are operated by municipalities, special districts, and private enterprise. Sources of supply for these agencies are various ditches originating in Clear Creek, Bear Creek, and the South Platte River, direct withdrawal from the South Platte River and Bear Creek, infiltration facilities near the South Platte River and Clear Creek and a number of wells in the shallow alluvium near the South Platte River and its tributaries. The location of various surface and infiltration sources of supply and significant waste discharges is shown in Figure 16, included in your handout here.

(Figure 16 is as follows:)

**SURFACE AND INFILTRATION SOURCES OF
PUBLIC WATER SUPPLY
DENVER METRO AREA
JULY 1965**

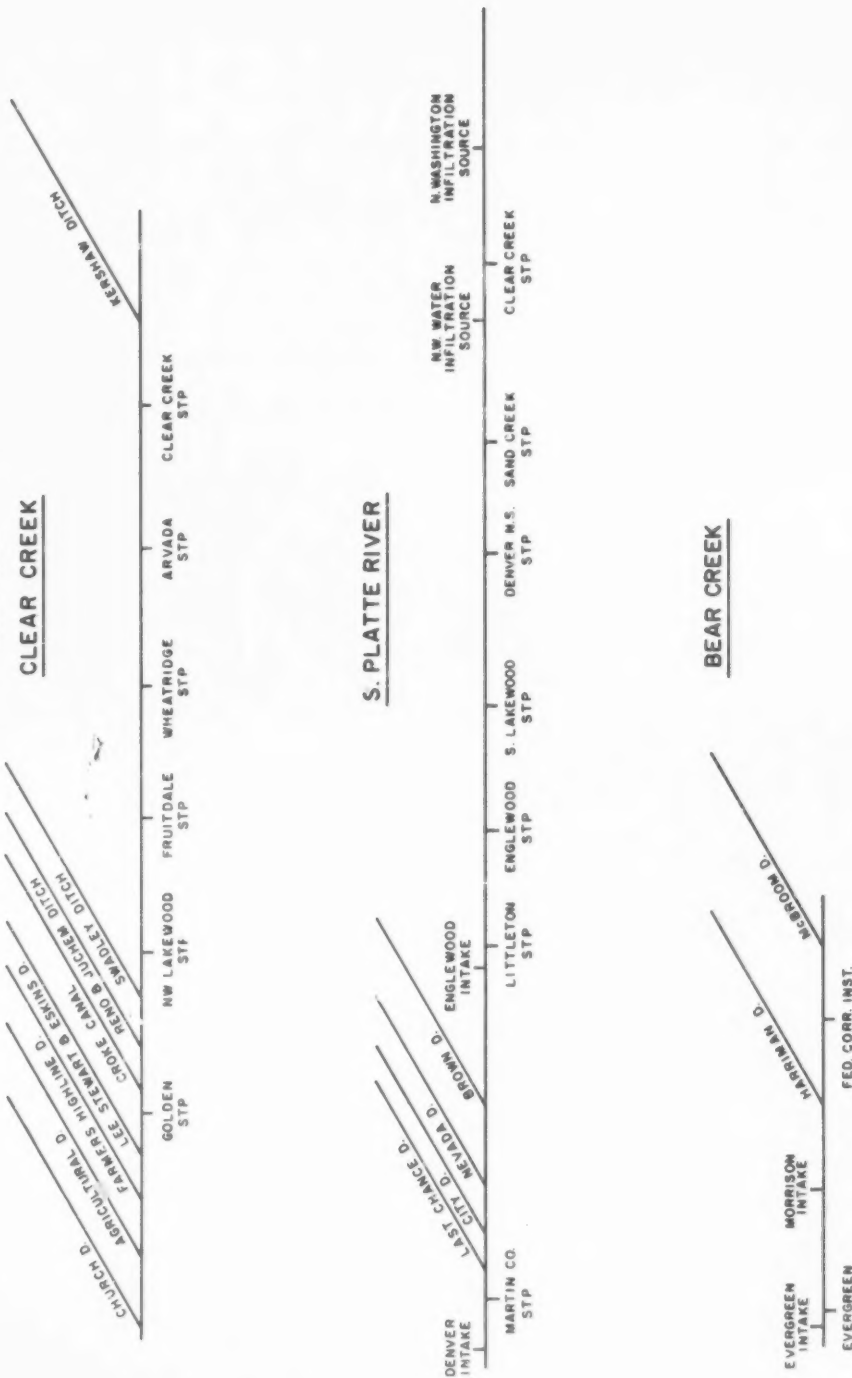


FIGURE 16

E. V. Fitzpatrick

The location of shallow wells or well fields used for public supply and significant waste discharges is shown in Figure 17, also included in your handout.

(Figure 17 is as follows:)

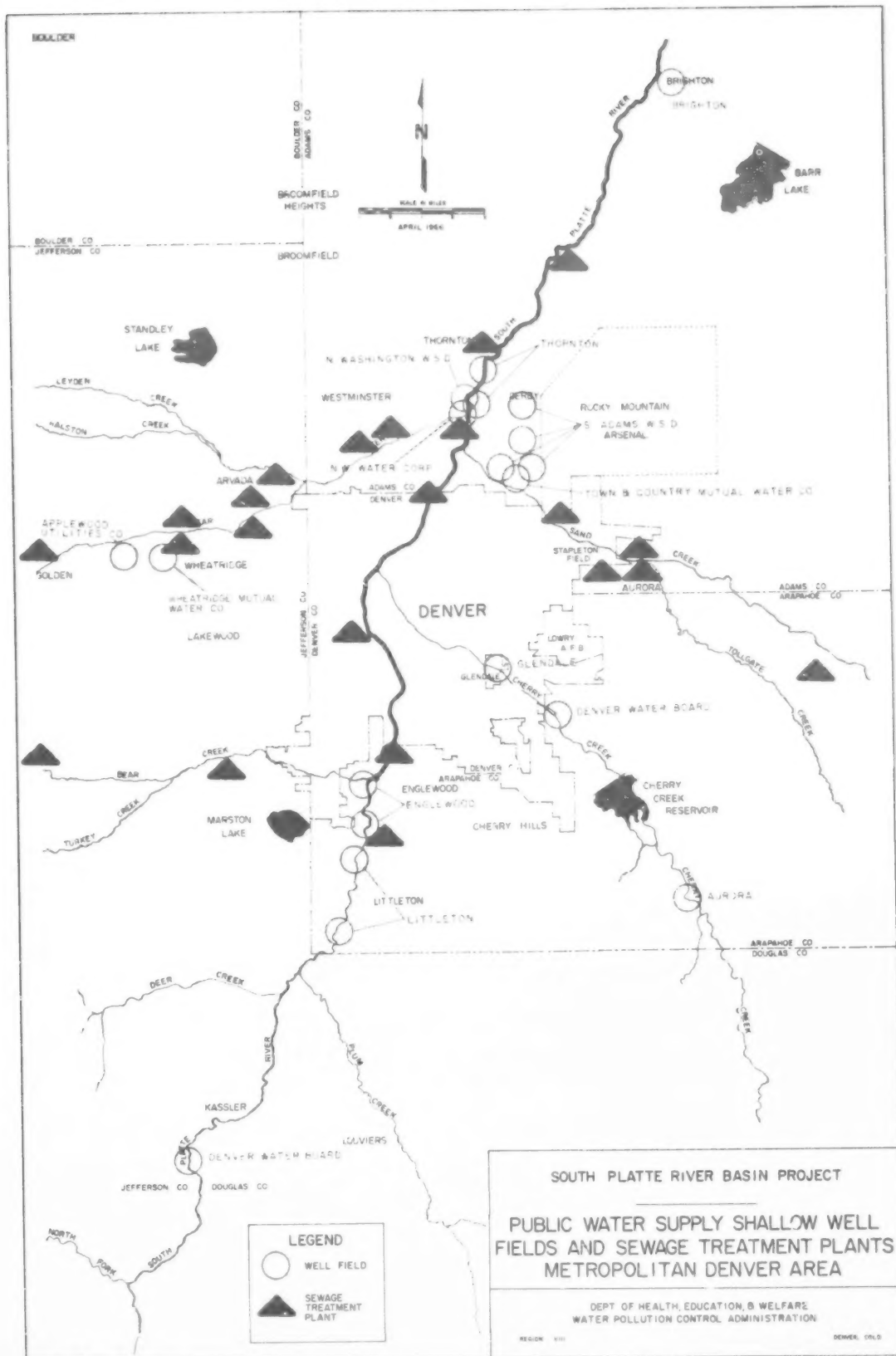


FIGURE 17

E. V. Fitzpatrick

The quality of finished water for the sources of supply, exclusive of the Denver Water Board, varies depending upon the demand and the adequacy of treatment provided. Although distribution system samples of selected supplies revealed no bacterial contamination, any interruption or bypass of a water treatment facility, particularly during periods of heavy demand, could introduce contamination into the distribution system. The surface water sources of supply from Clear Creek are heavily polluted, constituting a health hazard to the consumer. In the report entitled, "Metropolitan Water Supply," by the Inter-County Regional Planning Commission, dated May 1965, it was stated that a plant used to treat water from Clear Creek and operated by the City of Arvada had been abandoned due to poor quality of the water. The systems which utilize surface water from Clear Creek and the South Platte River provide detention ponds in order to reduce the turbidity and odor associated with the raw water. The lack of sufficient coagulation and settling basins associated with some water treatment plants could permit the passage of contamination into distribution systems, particularly during periods of heavy demand. In addition, the lack of duplicate chlorine feeders increases the hazard of bacteriological contamination when this equipment is out of service.

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In many instances, concentrations of ABS, total dissolved solids, sulfate, iron, manganese, oil, and nitrate in wells in the North Denver-Brighton area exceeded the recommended limits of the USPHS Drinking Water Standards. Although the nitrate concentrations can be attributed, in part, to agricultural activities, the ABS and oil are associated with domestic and industrial wastes. A case of methemoglobinemia, attributable to excessive nitrates, occurred in Brighton in 1962.

It was estimated by the Inter-County Commission that the present use of 250,000 AF in the Metro area will increase to 450,000 AF in 1980. This expansion will require new sources of supply and additional provisions for water treatment.

E. V. Fitzpatrick

This concludes this portion of the presentation.

Thank you very much.

MR. BAUER: Thank you, Mr. Fitzpatrick.

Mr. Chairman, now I would like to introduce Mr. E. J. Struzeski, Chief of Pollution Damage Assessment, who will present Project findings in the second major study area, the Middle and Lower Basin.

The presentation includes findings on Barr Lake, insect vector problems within the Basin, feedlot operations, and sugar beet processing wastes.

Mr. Struzeski.

E. J. Struzeski

STATEMENT OF EDMUND J. STRUZESKI,
CHIEF, POLLUTION DAMAGE ASSESSMENT
SECTION, SOUTH PLATTE RIVER BASIN
PROJECT, REGION VIII, WATER POLLUTION
CONTROL ADMINISTRATION, DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE,
DENVER, COLORADO

MR. STRUZESKI: Thank you, Mr. Bauer.

Mr. Chairman, Mr. Eckles, Conferees, ladies and
gentlemen:

The first item in the presentation concerns
Barr Lake and its odor relationships.

The Project report entitled, "Barr Lake and
Its Odor Relationships," previously submitted for the
record, is available at this conference. The following is
a summary taken from the above report.

Barr Lake is an artificial impoundment owned
and operated by the Farmers Reservoir and Irrigation Company
for the storage of irrigation water.

Over the years there have been numerous
complaints of odors by the residents of the City of
Brighton and vicinity. Brighton is located 2.7 miles

E. J. Struzeski

northwest of Barr Lake. These odors have been attributed to Barr Lake due to the organic loading imposed on this lake by inadequately treated sewage.

The primary source of pollution in the water diverted to Barr Lake is the partially treated sewage discharge from the Denver Northside Sewage Treatment Plant. Pollution is particularly severe in the winter during periods of low streamflow, when the flow of Denver effluent exceeds the natural flow of the stream and much of the water is diverted for storage into Barr Lake. Since the Denver Northside Treatment Plant discharges partially treated sewage, digester supernatant, and digesting sludge to the river, the Burlington-O'Brian Canal becomes quickly devoid of dissolved oxygen and releases a septic stream into Barr Lake at practically all times.

Barr Lake is filled primarily during the non-irrigation season when water temperatures are low and the biota are semi-dormant. After the ice leaves and the lake commences to warm in the spring, anaerobic bacterial decomposition of the organic material accelerates and increased quantities of hydrogen sulfide are thereby produced.

From an esthetic standpoint, the odors produced by Barr Lake have been intolerable at times. Severe odors in the immediate vicinity of the lake were verified by

E. J. Struzeski

Project personnel during the spring of both 1964 and 1965. There were virtually no odors at other times of the year in the vicinity of the lake. At Brighton, odors were apparently not detected as originating from Barr Lake during any part of the Project study period. It should be noted that odors in the Brighton area may originate from a number of sources other than Barr Lake, including the Gates-Cyclo waste lagoon, various irrigation canals which carry polluted South Platte River water, and several feedlots located north and south of Brighton.

Following completion of the Metro District treatment plant in late 1966, the average organic waste loading on Barr Lake should be reduced to 30 percent or less of the previous rate of loading and odor production cut to a minimum. In the future, Barr Lake could have odor production for a short period following the ice-melt. Odors may also come from the lake, but should not be intense and may be controlled by use of copper sulfate and other algae control measures.

Recommendations in this report which include:

- 1) the delivery of a high quality effluent from the Metro plant with a BOD removal of at least 92 percent; and 2)
- adequate treatment of all wastes entering the South Platte River above the Burlington-O'Brian Canal will afford

E. J. Struzeski

considerable improvement in the odor problem.

My second item of presentation concerns insect vector problems in the South Platte River Basin.

The Project report entitled "Significant Vector Problems in the South Platte River Basin," previously submitted for the record, is available at this conference.

Vector problems within the Basin were evaluated by Project personnel during the spring and summer of 1964. A review was made of past vector studies conducted over the area by the Disease Ecology Section, Communicable Disease Center, Greeley, Colorado, and other health agencies within the Basin. Also, a mosquito survey and general field observations were made within the Denver Metropolitan Area by the Project and CDC personnel during the summer of 1964.

Essentially, the vector problems within the Basin involve mosquitoes, rats and flies. Of considerable public health significance are the diseases transmitted by mosquitoes and rat-fleas, such as encephalitis and plague, respectively. Also, flies transmit a wide range of enteric diseases. Beyond the disease-causing potential, mosquitoes, rats and flies are responsible for substantial economic losses and require considerable expenditure for their elimination and control.

Significant vector populations of mosquitoes,

E. J. Struzeski

rats and flies do exist in the Basin and constitute a serious public health hazard. These vectors, especially mosquitoes and rats, are directly associated with the organic pollution present in waters of the Basin. This pollution is instrumental in creating and supporting the present high population levels of disease-carrying vectors, particularly in the Denver Metropolitan Area.

Ideal mosquito breeding grounds exist throughout the Basin. Improper irrigation practices create many seeps and standing pools of water in which mosquitoes breed readily. In addition, the many sloughs and backwaters along the river bottoms provide ideal areas for mosquito production. The presence of heavy organic pollution from sewage and industrial wastes in many of these waters enhances the environment for excessive production of those species of mosquitoes associated with the transmission of encephalitis. Encephalitis has occurred sporadically in the Basin, with the most recent outbreaks taking place in 1957 and 1964.

Certain areas within the Basin have serious rat infestation problems. The most notable of these is the concentration of large rat populations along the banks of the South Platte River and its tributaries in the northern sector of Metropolitan Denver. Rats are semi-

E. J. Struzeski

aquatic by nature, and adapt readily to life along the river banks -- particularly where brush and trash provide good cover and harborage. In this case an excellent food supply is readily available from the heavy load of floating organic pollution present in the South Platte River and its tributaries. The presence of this highly concentrated rat population constitutes a potential plague threat to area citizens.

Several species of biting and non-biting gnats and black flies breed extensively in the waters of the Basin. These insects cause severe human annoyance and occasionally are involved in disease transmission. The presence of organic pollution in the breeding waters creates a favorable larval environment and results in increased production of these insects.

Future vector population levels will remain high as long as significant quantities of organic pollutants are discharged to the waters of the Basin. Reduction of present vector populations will be accomplished through the abatement or elimination of the gross organic pollution now being discharged to receiving streams throughout the Basin, as recommended in this report.

My third item of presentation concerns feedlot wastes.

E. J. Struzeski

There are about 40 cattle feedlots in the South Platte River Basin which routinely feed more than 500 cattle at any one time. Of these feedlots, nine containing approximately 75,000 cattle with a potential population equivalent of 1.2 million contribute pollution directly to the South Platte River and its tributaries. The feedlots create both odor and water pollution problems. These odors are particularly severe in Denver, Brighton, Greeley and Sterling.

Pollution of surface watercourses by feedlot drainage has been observed in the Basin during Project investigations and is due to the following practices and conditions:

1. Open channels and pipes used for direct gravity drainage from feedlots into watercourses.
2. Intermittently pumped discharges into watercourses from collecting sumps and low field areas.
3. Direct surface runoff from feedlots adjacent to watercourses during periods of appreciable rainfall; and
4. Shallow infiltration from feedlots into adjacent watercourses during wet weather periods.

Disease hazards are associated with the bacteriological pollution of surface streams by swine and

E. J. Struzeski

beef cattle manure in the South Platte River Basin. Such diseases can be transmitted:

1. Animal to animal.
 - a. Downstream animal drinking.
2. Animal to man.
 - a. Downstream swimming and water contact sports.
 - b. Pollution of irrigated vegetables such as lettuce and celery, by irrigation water from polluted streams; and
 - c. Occupational hazards to cropland workers from manure in polluted irrigation water.

The more significant water-borne diseases involving swine, beef cattle, and man are considered to be anthrax, leptospirosis, and salmonellosis. No epidemiological investigation of the incidence of zoonotic diseases in man and animal has been performed by the Project. It is considered, however, that opportunities for disease transmission from animal to animal are greater than from animal to man, due to the animal drinking water factor, and because stream water in the Basin, at the present time, is not used directly for human consumption below these waste sources.

Pollution of surface water resources caused by feedlot wastes is now occurring at several places

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throughout the South Platte River Basin. Feedlot drainage is presently being pumped, or piped directly to surface streams, and in other cases overland surface drainage from feedlots is reaching these streams.

Basically, the environmental control of feedlot waste problems includes the surface water runoff, prevention of surface runoff pollution, ground-water pollution, odors, and housefly production in the manure.

My fourth item of presentation concerns sugar beet processing wastes.

Water pollution caused by discharge of sugar beet processing wastes in the South Platte River Basin is of major concern. It is recognized that the Great Western Sugar Company, which owns and operates all plants within the Basin, was successful in the 1940's in reducing their waste loads. Since that time, the industry has made progress towards further reduction, but there also has been an increase in the total amount of beets processed. The wastes from the ten plants, which are operating today, were equal in 1949 to a population equivalent of 3.1 million people. In 1963-1965, these same ten plants were discharging wastes equivalent to 2.3 million people, of a 25 percent reduction from 1949. Sugar beet waste pollution adversely affects more than 215 miles of stream, which represents about 40

E. J. Struzeski

percent of primary stream mileage within the South Platte River Basin.

The quality of stream waters during the sugar beet processing seasons of 1963 through 1965 are described for five major areas:

- 1) St. Vrain Creek below Longmont;
- 2) the Big Thompson River below Loveland;
- 3) the Cache la Poudre River below Windsor;
- 4) the South Platte River from Brighton to Kersey; and
- 5) the South Platte River from Fort Morgan to the Colorado-Nebraska State line.

The first major area is St. Vrain Creek. Major waste discharges to St. Vrain Creek are from the sugar beet mill, the Kuner-Empson cannery and the municipal sewage treatment plant, all of which are located at Longmont, Colorado, and the City of Boulder sewage treatment plant. Figure 18, included in your hand-out, shows the results of two studies.

(Figure 18 is as follows:)

QUALITY of ST VRAIN CREEK WATERS January, 1964 and November, 1965

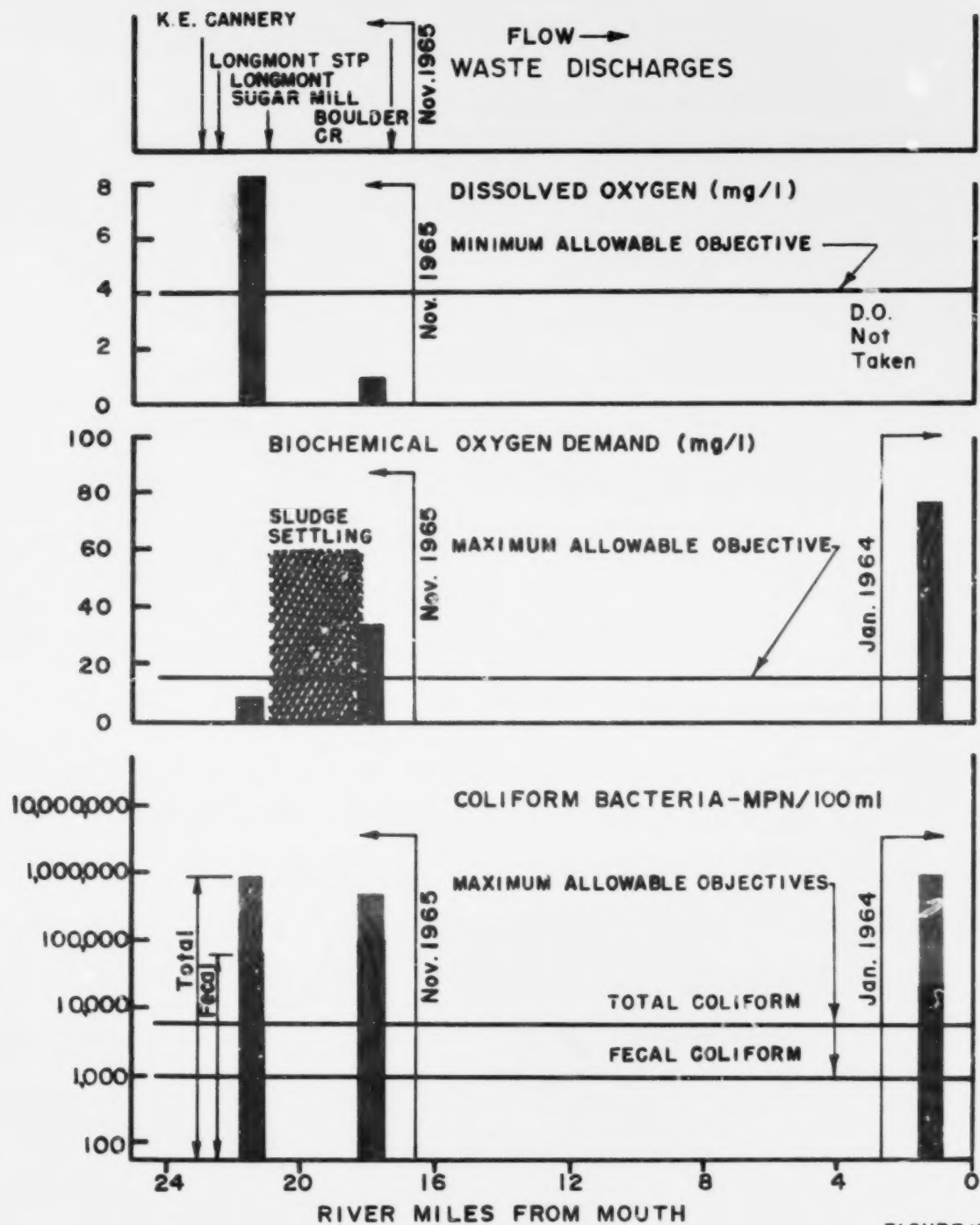


FIGURE 18

E. J. Struzeski

MR. STRUZESKI: In January 1964, St. Vrain Creek was sampled near its mouth. In November 1965, the same stream was sampled in the Longmont area. During the 1965 study, the dissolved oxygen of the stream was near saturation above the mill, but four miles below the mill discharge it averaged only 0.7 mg/l. The 5-day BOD increased from 9 mg/l in the stream directly above the Longmont sugar mill discharge to 33 mg/l at a point four miles downstream. The waste flow from the mill contributed 240,000 P. E. of BOD to the stream. Only part of the BOD from the mill reached the downstream sampling point because of extensive settling of waste material directly below the mill outfall. Even with the majority of wastes settling out, the BOD downstream from Longmont was more than twice the allowable objective of 15 mg/l.

The BOD of 9 mg/l above the mill reflected the waste load from the Longmont sewage treatment plant. There were 12,000 P. E. of residual wastes from the municipal treatment plant and up to 60,000 P. E. of waste load from the Longmont cannery when it is operating. In November 1965, the sugar beet mill accounted for more than 90 percent of the organic waste load to the stream in the Longmont area. Discharges from the sugar mill and the Longmont municipal treatment plant resulted in coliform densities approximately

E. J. Struzeski

160 times, and 94 times, respectively, the allowable objective of 5,000/100 ml for total coliform and 1,000/100 ml for fecal coliform.

The January 1964 results at the mouth of St. Vrain Creek indicate that severe degradation does occur over the entire twenty-two miles of stream below Longmont. Since the waste load in the lower reaches of the stream approximated 220,000 P. E. of BOD in January 1964, there was little settling of wastes in the stream. In addition, the South Platte River is affected by the heavy waste load discharged into it. At its mouth St. Vrain Creek carried BOD, total coliform bacteria, and fecal coliform bacteria that exceeded allowable objectives by 4,157 and 22 times respectively.

The second major area includes the Big Thompson River below Loveland and also the Little Thompson River as its main tributary stream. Major waste discharges are from the Loveland sugar mill, the Loveland municipal sewage treatment plant and the Monosodium Glutamate-sugar recovery plant at Johnstown on the Little Thompson River.

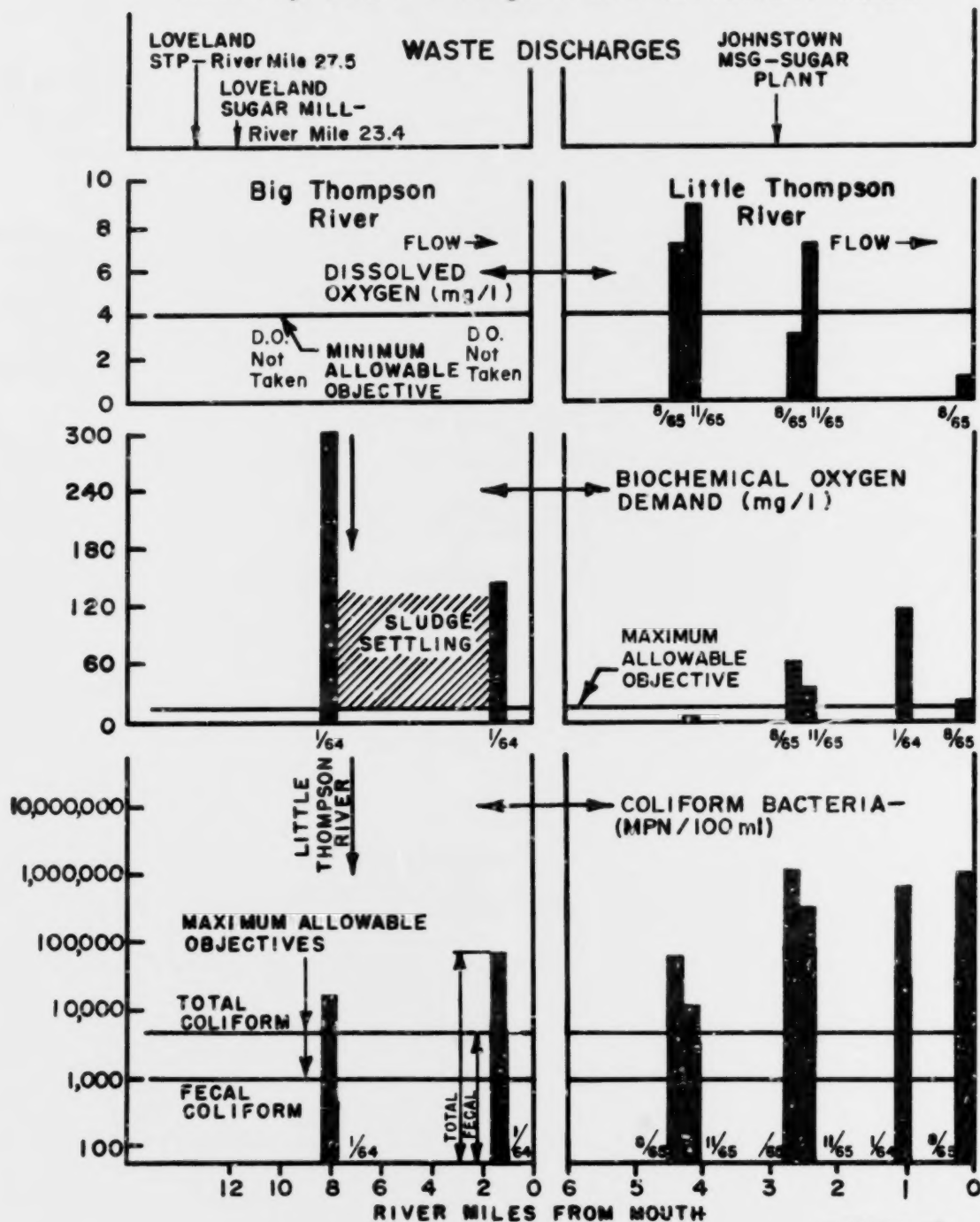
Figure 19, included in your hand-out, shows the results of stream studies conducted on the lower ends of the Big Thompson and Little Thompson Rivers during

E. J. Struzeski

January 1964, and on the Little Thompson River again in August and November of 1965.

(Figure 19 is as follows:)

QUALITY OF BIG THOMPSON AND LITTLE THOMPSON RIVER WATERS January 1964 & August and November 1965



E. J. Struzeski

In January 1964, the Big Thompson River 19 miles below Loveland, as shown in the figure, carried a waste load equal to 300,000 P. E. or 25 tons of BOD per day. Of this load, two percent or less originated from the Loveland sewage treatment plant, with the remainder from the sugar beet mill. The Big Thompson River at this point contained 296 mg/l of 5-day BOD. The values found exceeded allowable stream objectives by 19 times in the case of BOD, was 4 times the total coliform objective, but did not exceed the maximum allowable fecal coliform level. Extensive waste settling occurs in the river below Loveland. These sludge deposits further aggravate the severe degradation of the stream.

The Big Thompson River at its mouth was influenced by the inflow of the Little Thompson River at River Mile 7.0. BOD concentration at the mouth decreased to 145 mg/l due to greater flow even though the Big Thompson River was now carrying a waste load equal to 350,000 P. E. Total and fecal coliform bacteria increased to exceed the allowable objectives by 13 and 4-fold. In addition to the Big Thompson River being intensely affected by pollution for the 26 miles below Loveland, this large organic load is in turn dumped into the South Platte River.

The Little Thompson River was sampled below

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the Johnstown MSG sugar recovery plant in January 1964, and both above and below the plant in August and November 1965. The results are shown in Figure 19, included in your hand-out. Above Johnstown, the Little Thompson River is affected by irrigation return and transfer flows, and by residual wastes from upstream communities. The dissolved oxygen content was high, from 7.1 to 9.1 mg/l, and the BOD was low at 2.8 mg/l. Because of upstream effects and rain-fall occurring previous to the field survey, bacterial values were slightly higher than background.

Waste effluent from the Johnstown industrial plant was rated at 95,000 P. E. of BOD in August 1965. After plant modifications made in late summer, it was found to contain 70,000 P. E. of BOD in November 1965. The dissolved oxygen in the stream one-half mile below the plant ranged from 3.2 to 7.2 mg/l in 1965, and at a point 2 miles further downstream was only 1.1 mg/l in August 1965. BOD concentrations in the stream below Johnstown ranged from 22 to 114 mg/l as compared to the value of 2.8 mg/l in the stream above Johnstown. The downstream dissolved oxygen drops considerably under the allowable stream objective, and the BOD below Johnstown exceeds the objective by 50 percent up to 660 percent. Coliform bacteria from above to below Johnstown increased in the

E. J. Struzeski

order of 6 to 110 times for total coliform and from 6 to 20 times for fecal coliform, being much in excess of allowable stream objectives.

The third area is the Cache la Poudre River. Major waste discharges to the Cache la Poudre River are from the three sugar beet mills at Windsor, Eaton, and Greeley, the Greeley Sewage Treatment Plant, and at the time of survey from the Monfort Packing Company. Since late summer of 1965, waste effluents from the meat processing operations have been absorbed into the Greeley sewage treatment plant. Also, this treatment plant has been enlarged since the time of the survey. The Cache la Poudre River was investigated in January 1964 from Windsor to the stream mouth.

In May 1965, a study was made of the Monfort Packing Company waste effluents, followed by studies in November 1965 on the Eaton sugar mill discharges and the quality of water existing in Eaton Draw.

In January 1964, the three sugar beet mills discharged a waste load equal to the BOD found in raw sewage from a population of 1,070,000 people. In addition, the Monfort Packing Company was discharging processing wastes containing 100,000 P. E. and the Greeley municipal

E. J. Struzeski

treatment and sewerage system, which was overloaded at that time, contributed another 25,000 P. E. of waste load to the river. The Cache la Poudre River was receiving a total waste load of 1,200,000 P. E., with dire consequences to the river. Results of the stream studies are shown in Figure 20 of the hand-out.

(Figure 20 is as follows:)

QUALITY of CACHE LA POUDRE RIVER WATERS

January 1964

WASTE DISCHARGES

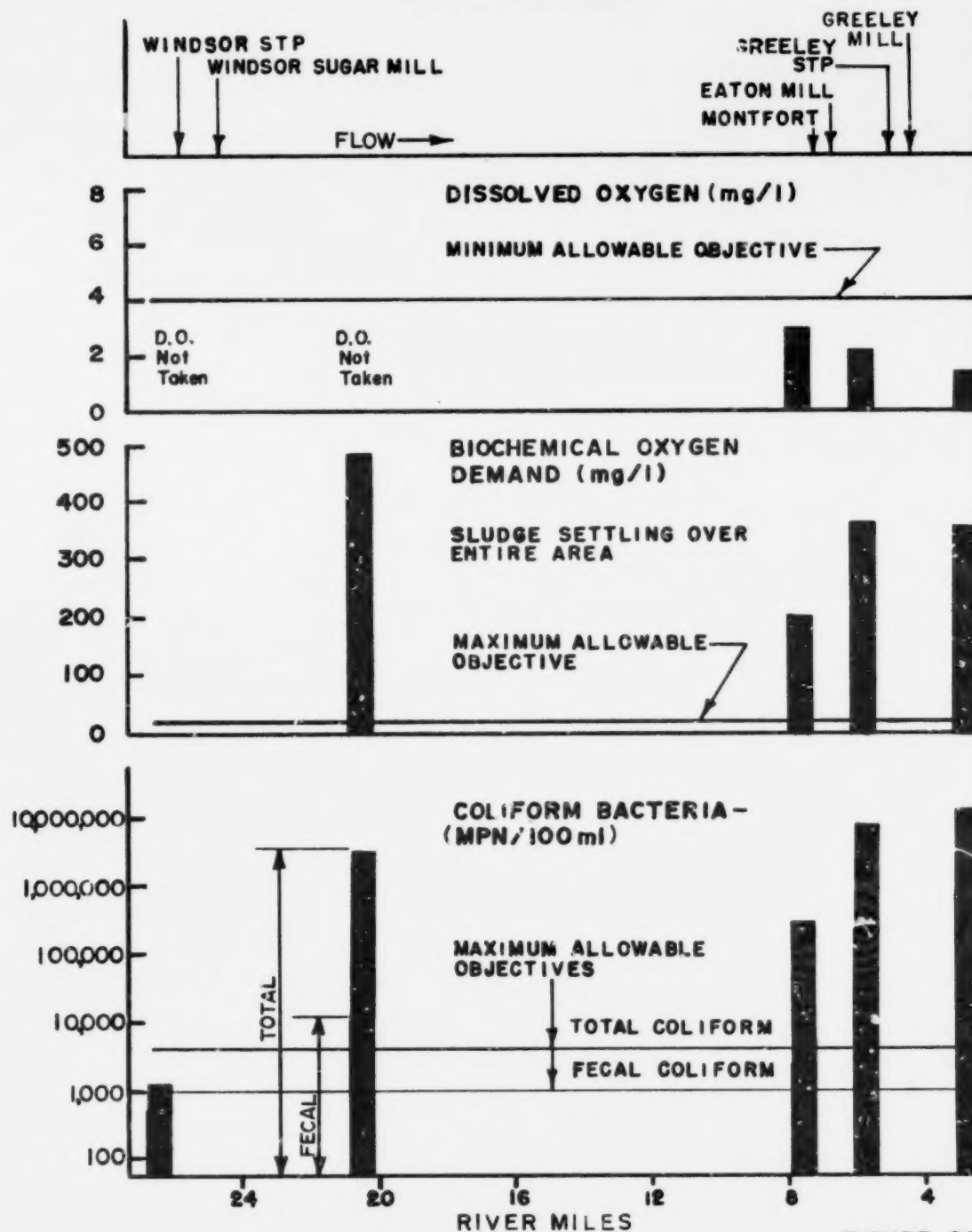


FIGURE 20

E. J. Struzeski

The Cache la Poudre River entering Windsor was of good quality. The Windsor sewage treatment plant contributed approximately 400 P. E. to the river and the Windsor sugar plant contributed 440,000 P. E. in January 1964. From above Windsor to a point on the river four miles below the sugar mill, the BOD increased 250 times from about 2 mg/l, not shown in the figure, to a level of 482 mg/l, total coliform bacteria increased 2,200 times to 2.4 million per 100 ml, and fecal coliform increased 22-fold to 11,000 per 100 ml. The stream below Windsor was comprised almost entirely of high-strength and readily decomposable waste from the Windsor sugar mill. The BOD concentration of 482 mg/l in the stream is one of the highest values that has been observed for any stream in the country. The sludge banks in this stretch of river further compounds the existing problems, and the condition of the stream is one of absolute degradation.

In Greeley, at the Fairgrounds, the BOD content was 12.5 times the allowable stream objective and the total coliform level was 44 times the allowable objective.

Through Greeley, the river receives heavy waste loads from the sources previously mentioned, and in addition is adversely affected by the many gravel washing operations in the area. The Eaton sugar mill was

E. J. Struzeski

discharging in January 1964 a waste load equal to 470,000 population equivalents and the Greeley sugar mill discharged another 160,000 P. E. of waste to the Cache la Poudre River.

The pollution levels in the Cache la Poudre River from Greeley to the confluence with the South Platte River are in the severe degradation zone. In January 1964, from the Fairgrounds to a point two miles below Greeley, the BOD increased 2-fold; the dissolved oxygen decreased from 3.0 to 1.6 mg/l, with many individual values near 0.0 mg/l; total coliform bacteria increased 50-fold; and fecal coliform bacteria increased 240-fold. The largest single waste load in January 1964 was the Eaton Ditch drainway. The lower portion of the Cache la Poudre River during the wintertime is the most severely polluted in the entire South Platte River Basin.

The fourth area of study comprises the South Platte River from Brighton downstream below Greeley to Kuner, Colorado, a total stream distance of 54 miles. The South Platte River entering Brighton is heavily polluted by organic wastes from the Denver Metropolitan Area. Other

E. J. Struzeski

major waste loads are the processing effluents from the Brighton sugar mill and the heavy waste loads contained in the streamflows entering the study area. These latter streamflows include the St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River. Stream study was carried out in January 1964 from Platteville to Kuner and additional studies were conducted in January 1965 at the Brighton sugar beet mill. The results obtained are shown in Figure 21, included in the hand-out.

(Figure 21 is as follows:)

QUALITY OF SOUTH PLATTE RIVER WATERS Brighton to Kuner January, 1964 and 1965

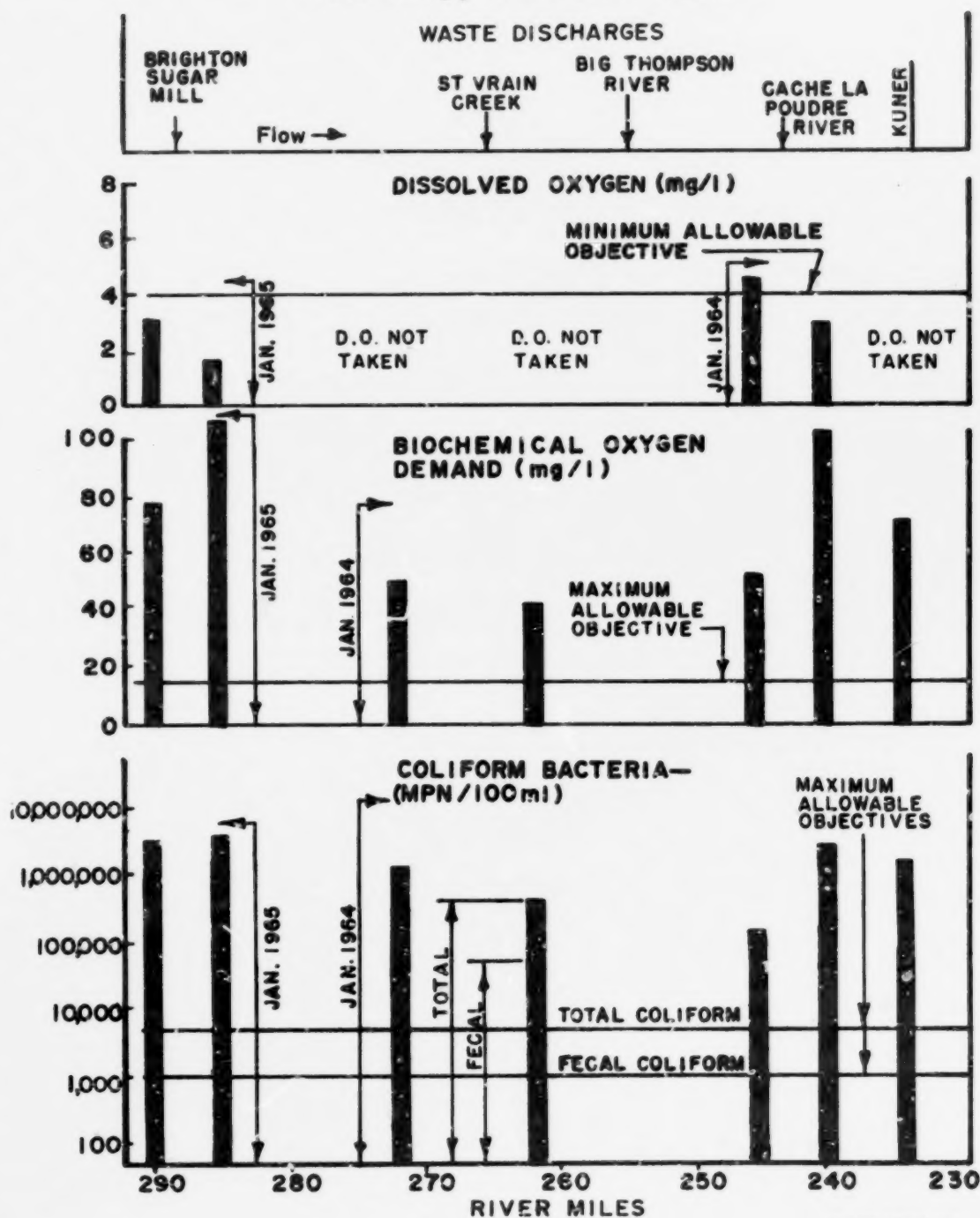


FIGURE 21

E. J. Struzeski

MR. STRUZESKI: The South Platte River for the entire distance of more than 75 miles from Denver to Kuer is grossly polluted. The values were many times over the allowable objectives for BOD and coliform content, and except for one case, considerably below the objective of 4.0 mg/l dissolved oxygen. The severe degradation of this important reach of river is a matter of extreme concern.

In January 1965, a very large waste load of 250,000 P. E. from the Denver Metropolitan Area reached Brighton. In January 1965, the Brighton mill discharged processing effluents into the river equal to 160,000 P. E. The dissolved oxygen content of the river above the sugar mill was low at 3.1 mg/l and below the mill was further reduced to 1.7 mg/l.

The South Platte River from Platteville, at about River Mile 262, to the community of Kuer, was studied in January 1964. The BOD concentration and coliform densities of the river upstream of Platteville decreased from the levels below Brighton. However, the BOD in the river above Platteville was still more than three times the allowable objective and total and fecal coliform bacteria levels were 220 times and 330 times the respective bacterial stream objectives. Upstream waste loads predominated in the river down to Platteville.

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Below Platteville, the inflows of the three major tributaries: St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River determine to a large degree the amounts of pollution found in the South Platte River. Without these waste-laden tributary streams, the pollution levels in the South Platte River would diminish until reasonably good quality water would exist in the downstream areas of Kersey and Kuer. Instead, a different picture results. Waste loads brought in by St. Vrain Creek and the Big Thompson River sustain the level of pollution previously observed at Platteville. The heavy waste load of the Cache la Poudre River causes substantial increase in BOD and bacteria concentrations of the South Platte River. Respective input loads of these three tributary streams in January 1964 were 220,000 P. E., 350,000 P. E., and 890,000 P. E. The South Platte River below the Cache la Poudre River carried a waste load of 1,370,000 P. E., which is more than the maximum load found below the Denver Metropolitan Area. Thus, 55 miles downstream from Denver severe stream pollution problems are caused by sources other than large population centers. The large majority of this waste load originates from the many sugar beet mills located upstream.

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The fifth and last major area considered is the lower South Platte River which starts at Fort Morgan and runs a distance of approximately 110 miles to the Colorado-Nebraska Stateline. There are two principal factors controlling the quality and quantity of streamflow in the lower South Platte River. These factors comprise the many diversions taking flow from the River for irrigation water storage, and the important waste discharges from the three sugar beet mills located at Fort Morgan, Sterling, and Ovid. These canal diversions can withdraw almost the entire streamflow at any given point. However, ground-water inflow plays an important role in returning water to the River and maintaining basic streamflows. A sampling survey was conducted in December 1963 on the South Platte River from Fort Morgan to the Stateline. It was found that the three mills were discharging a total organic waste load of 550,000 P.E. to the River. Minor waste loads from the Fort Morgan, Brush, Sterling, and Julesburg sewage treatment plants totalled 10,000 P.E., which was less than two percent of the total organic wastes reaching the River at this time. Results of the December 1963 stream studies in the lower South Platte River are shown in Figure 22 of your handout.

(Figure 22 is as follows:)

**QUALITY OF SOUTH PLATTE RIVER WATERS
Fort Morgan to State Line
December, 1963**

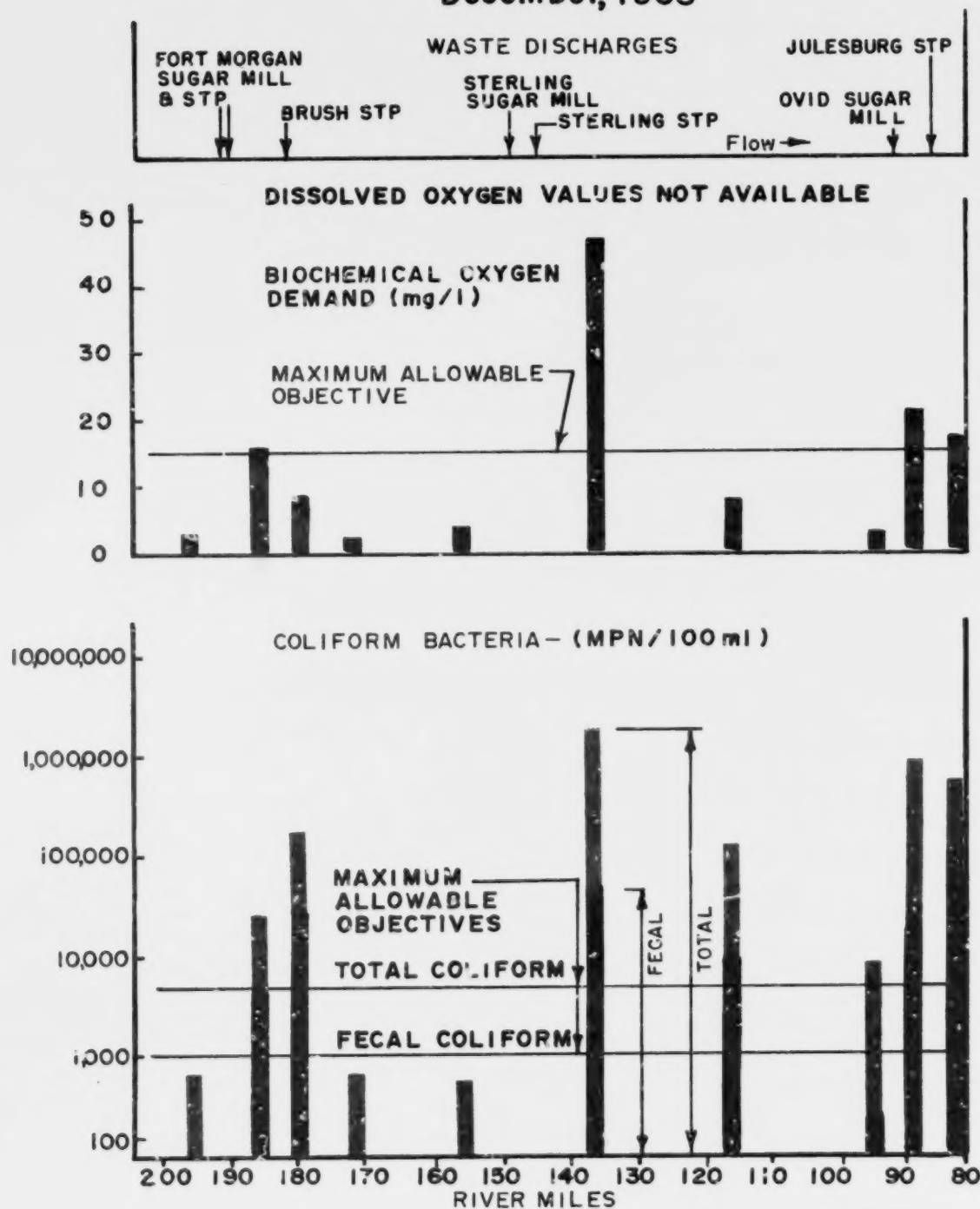


FIGURE 22

E. J. Struzeski

The South Platte River above Fort Morgan was comprised almost entirely of ground-water accretions entering upstream, and these waters contained virtually no waste load. The 5-day BOD was 2 mg/l, and total and fecal coliform bacteria were 490 and 80 organisms per 100 ml respectively. This station provided a background upon which water quality conditions downstream could be compared.

Below the Fort Morgan sugar beet mill and the municipal waste treatment plant, the South Platte River changed from a clean to a polluted stream. Residual wastes were also discharged to the stream by the City of Brush sewage treatment plant but still the Fort Morgan sugar mill accounted for 95 percent of the total BOD waste load added to the stream from Fort Morgan down to Sterling. The BOD between Fort Morgan and Sterling reached a maximum value of only 15 mg/l. However, a relatively large River flow was present in December 1963 and furthermore, BOD load was removed from the flowing waters by settling to the stream bottom. There are higher BOD values in the stream during low flow periods. The South Platte River below Fort Morgan as compared to above showed an increase of 300-fold in total coliform and 340-fold in fecal coliform. Coliform levels downstream were many times over the allowable stream objectives.

Effects of pollution disappeared in the River some

E. J. Struzeski

20 miles below Fort Morgan. This was due to waste loads together with streamflow being diverted almost totally to off-site irrigation storage reservoirs. The South Platte River from Balzac to Sterling, a distance of some 22 miles, was comprised of groundwater inflow carrying little or no waste load. BOD and coliform concentrations in this stretch of stream were in the very low range.

The Sterling area contributes substantial waste to the South Platte River. The Sterling sugar beet mill discharged 250,000 P.E. of waste load to the River and another 3,000 P.E. of waste load was discharged by the Sterling municipal sewage treatment plant. The River 7 miles downstream from Sterling was severely degraded and contained 46 mg/l 5-day BOD, 2.3 million total coliform bacteria per 100 ml and 45,000 fecal coliform/100 ml. Sludge deposits blanketing the stream bottom further intensified the existing pollution problems. Below Sterling the BOD concentration was more than 3 times the allowable level, and bacterial concentrations were 450 times the total coliform objective and 45 times the fecal coliform objective. Large expansion of the packinghouse industry predicted in this area will further necessitate stringent control of all wastes discharged to the River at Sterling.

Twenty-nine miles downstream from Sterling the

E. J. Struzeski

River had improved but did not meet the bacteriological quality objectives. Fifty miles downstream, above Ovid, the water quality approached background conditions. In December 1963 little waste load was reaching Ovid from Sterling. However, at other times, the majority of the Sterling waste load is definitely carried downstream into the Ovid area creating very poor water quality conditions along this entire 50-mile stretch of River.

The Ovid sugar beet mill, 11 miles upstream of the Colorado-Nebraska Stateline, is the last major waste source before the River leaves the State. The Ovid Sugar factory discharged 205,000 P.E. of waste load to the River and 8 miles farther downstream the Julesburg, Colorado, municipal sewage treatment plant added about 800 P.E. A large part of the organic wastes is carried to the Colorado-Nebraska Stateline.

Waste loads from Ovid increased the 5-day BOD in the River from 2 to 20 mg/l, total coliform from 8,000 to 950,000 organisms/100 ml, and fecal coliform from 200 to 21,000 organisms/100 ml. At the Stateline there were slight decreases in BOD and total coliform, but the fecal coliform level continued to rise. the BOD at the Stateline was 5 mg/l in excess of the water quality objective. Total and fecal coliform bacteria were respectively, about 150 times and 35

E. J. Struzeski

times the maximum limits.

The December data do not reveal the worst water quality conditions that can exist in the lower South Platte River. Results from the Water Pollution Surveillance System Station at Julesburg for the period of October 6 to December 30, 1964, revealed an exceptionally high average BOD of 145 mg/l with an individual maximum value of 680 mg/l. The average dissolved oxygen was 3.9 mg/l and there was a complete absence of oxygen at times. Settling of wastes downstream of Ovid with formation of sludge deposits probably occurred. The assimilative capacity of the River for wastes from Ovid and Sterling is insufficient to prevent severe pollution at the Stateline.

MR. STEIN: I think this might be a good point to break, since he is going into another portion of the presentation. I think we are moving along very well and the report is very good. If you will permit me, I would like to go off the record for just a second, before we recess for lunch.

(Discussion off the record.)

MR. STEIN: We will stand recessed for lunch until two o'clock.

(Whereupon, at 12:10 p.m., a recess was taken until 2:00 p.m. of the same day.)

K. Monfort

AFTERNOON SESSION

MR. STEIN: May we reconvene?

As you know, this is a conference and we try to keep the schedule and agenda as flexible as possible.

At this time we will ask Dr. Cleere to call on someone from Colorado, where the force of business makes it necessary for him to appear at this time.

DR. CLEERE: By special request, we are going to call on a representative of the Livestock Feeders Association. I believe Senator Kenneth Monfort will speak for this Association.

Senator Monfort.

MR. STEIN: Thank you, Doctor.

STATEMENT OF KENNETH MONFORT, STATE
REPRESENTATIVE, COLORADO, REPRESENTING
THE COLORADO CATTLE FEEDERS ASSOCIATION,
ROUTE 2, BOX 363, GREELEY, COLORADO

MR. MONFORT: Thank you, Dr. Cleere.

Mr. Stein, others in attendance at this conference -- I might say other polluters -- I would like to report as a member of the Colorado Cattle Feeders

K. Monfort

Association, speaking for the Association, some of what our membership is doing in the field of pollution or pollution control, rather.

We believe that we have taken many steps to minimize the problem that we admit that we create. These steps may not deal altogether with water pollution, but I briefly would like to mention the steps that have been taken by many, if not most of the feedlot operators within the State.

The first step, and probably the most important, is the fact that every feedlot in the State has changed their, what we might call housekeeping program, keeping the feedlots much cleaner, moving out the manure which does collect much more often than we used to.

Our own feedlot is doing this on a year-round basis, and I think most of the feedlots that have been criticized in the past are doing it.

In addition to this -- and this would relate more to air pollution -- I think practically every large feedlot either has sprinkling systems to control dust, or is in the process of installing them, or in the process of engineering them.

Also, I think every feedlot that I know of is making a diligent effort on rodent and insect control. This

K. Monfort

is being done throughout the State.

Last year was a particular problem year as far as this is concerned, because there were tremendous June floods, which created an insect problem throughout the State, which I am sure Dr. Cleere is well aware of.

In addition to that, many of the feedlots are doing much experimenting, much testing of what we call masking or inhibiting agents, which are designed to deal with the odor problem which does emanate from feedlots, unfortunately.

One of the other areas that we are endeavoring to do some work in is that of research projects with our State University in regard to water and air pollution and in regard to odor control.

The State University at Fort Collins has started a program and is currently coming up with a plan of study in this regard.

There are those in the audience who might have influence on research funds that are available in this regard. I think they could note that Colorado State University is looking for funds, and they are ready and willing and, we believe, able to attack this problem.

The sixth thing that I would like to mention that the Cattle Feeders Association is doing is that we

K. Monfort

are currently in the process of trying to write a State sanitation law, or a proposed law that could be submitted to the State Legislature next year.

Our feeling on this is that this is something that should be controlled. We believe in self-policing, but we think the policing will be much more effective if we have a policeman, you might say.

This law that we are endeavoring to write would be a strict law. It would be my hope that it would be patterned somewhat after the water pollution law that Senator Hahn sponsored in the last legislature, and which is the law in the State now.

This pretty well concludes the plus side of what we are doing. We do have a certain problem, and this is a problem that is, I am sure, of interest at this particular conference. This is the problem of runoff from the feedlots during heavy storm periods.

In this regard, we have problems in controlling this, and I would like, to be sure I am as brief as possible, to read from the letter that I had sent Dr. Cleere in this regard:

"The problem is of course quite apparent.

Drainage from Feed Lots does enter the river" --

our river is the Cache la Poudre River -- "and many other rivers. I believe that the newly

K. Monfort

"created State Water Pollution Commission and the Federal Government will have to decide if this is a problem and then how to handle the problem. In my mind, this is a highly complex problem. I do not believe that we can treat storm runoff from Feed Lots any differently than we can such runoff from other agricultural land or from cities. I believe it totally unrealistic to expect, for instance, the City of Denver to construct sewage treatment plants that will treat the runoff that might occur in the city during such periods as last June. I am not saying that this would not be desirable, merely that at this time it is not feasible unless the Federal Government would very substantially increase their aid in this area. If such an action were undertaken, it would necessarily have to include the agricultural lands that also add to the pollution problem.

"An effort to force every cattle feeder in the South Platte basin to treat this runoff water before allowing it to enter the rivers would undoubtedly ruin the feeding industry in this area. The only possibility of accomplishing this goal is with

K. Monfort

"the aforementioned massive Federal assistance.

"To summarize, I would like to re-emphasize several points. (1) The problem of runoff from Feedlots is only a problem when the rivers are very high because of other runoff which includes other agricultural land and urban communities. (2) The feeding industry is certainly in no economic position to treat this "storm runoff" without tremendous assistance from some governmental units. (3) Is it economically feasible to assure the nation that even during periods of tremendous precipitation, such as occurred last June, that there will be no pollution from agriculture or from urban communities in our streams?

"I believe that there is no excuse at this time, in our present society, for allowing cattle feeding and its resultant pollution to be conducted in such proximity to the rivers to where those rivers are continually polluted. However, I must admit that I do not know of one case where this is occurring. I believe that rather obviously cattle should be kept out of the rivers. I believe that the cattle feeders in Colorado and in the nation should do all within their power to control such

K. Monfort

"such public problems as runoff, odor and dust. However, I believe it totally unrealistic to expect them to do that which no municipality can do -- treat and purify the storm runoff waters."

I will close by saying that the cattle feeding industry is interested, probably more interested in pure water than practically any other group of people in the State. Not only do we ourselves drink the water, but we feed thousands upon thousands of cattle who can only do well, and do well for us economically, if the water they drink is as pure as possible.

If there are any questions, I will try to answer them, or otherwise I will quit.

MR. STEIN: Are there any questions or comments?

Do you want to answer them now, or will a representative of yours be here tomorrow?

We can ask these questions of you now, Senator.

MR. MONFORT: I would be glad to try to answer them now.

I have some documents that I would like to enter into the record.

MR. STEIN: Without objection, these will be entered as if read.

(The documents referred to are as follows:)

K. Monfort

THE MONFORT FEED LOTS

Finishers of Good Cattle

Warren H. Monfort Kenneth Monfort

Greeley 352-3396 - Denver 623-5907

Greeley, Colorado

April 26, 1966

Dr. Roy L. Cleere

Director of Public Health

Department of Public Health

4210 East 11th Avenue

Denver, Colorado

Dear Dr. Cleere:

Attached to this letter you will find a very recent report to the Ad Hoc Greeley Odor Control Committee that deals with our efforts in respect to this very important problem. I am afraid that it does not touch on the question of stream pollution. This letter is meant to bring you, your department and interested Federal officials up to date in this regard.

For the past two years we at Monfort Feed Lots have recognized the problem of drainage into our natural drainage basin, the Cache La Poudre River. We have constructed at the Feed Lots, catch basins to catch the runoff from the Feed Lots during severe storms. These basins have been

K. Monfort

constructed with the protection of our neighbors in mind rather than with thoughts devoted to stream pollution. This water is then allowed to enter the Poudre River at such times of runoff by ditch and by tile line. This is only done at times of heavy runoff -- a rain in the magnitude of 3/4 inch or better. Obviously, this is at a time when the river is already high with runoff from other sources.

Our plans and policies in this regard are well known and approved by the Weld County Health Department, which has given us many suggestions in this regard. We have spent in excess of \$100,000 to control this problem. We have solved the problem as far as our neighbors are concerned and as far as small amounts of runoff occurring from small storms is concerned. Obviously, we have not solved the problem of stream pollution from this runoff in the really big storms. This water must drain somewhere at such times and we have merely helped it get to the river, which is one mile distant, in as quick and orderly fashion as possible.

The problem is of course quite apparent. Drainage from Feed Lots does enter the river and many other rivers. I believe that your department, the newly created Water Pollution Commission and the Federal Government will have to decide if this is a problem, and then how to handle the problem. In my mind, this is a highly complex problem. I do not believe that we can treat storm runoff from Feed Lots

K. Monfort

any differently than we can such runoff from other agricultural land or from cities. I believe it totally unrealistic to expect, for instance, the City of Denver to construct sewage treatment plants that will treat the runoff that might occur in the city. I am not saying that this would not be desirable, merely that at this time it is not feasible unless the Federal Government would very substantially increase their aid in this area. If such an action were undertaken, it would necessarily have to include the agricultural lands that also add to the pollution problem.

An effort to force every cattle feeder in the South Platte basin to treat this runoff water before allowing it to enter the rivers would undoubtedly ruin the feeding industry, Colorado's largest agricultural industry, in this area. The only possibility of accomplishing this goal is with the aforementioned massive Federal assistance.

To summarize, I would like to re-emphasize several points. (1) The problem of runoff from Feedlots is only a problem when the rivers are very high because of other runoff which includes other agricultural land and urban communities. (2) The feeding industry is certainly in no economic position to treat this "storm runoff" without tremendous assistance from governmental units. (3) Is it economically feasible to assure the nation that even during periods of tremendous

K. Monfort

precipitation, such as occurred last June, that there will be no pollution from agriculture or from urban communities in our streams?

I believe that there is no excuse at this time, in our present society, for allowing cattle feeding and its resultant pollution to be conducted in such proximity to the rivers to where those rivers are continually polluted. However, I must admit that I do not know of one case where this is occurring. I believe that rather obviously cattle should be kept out of the river. I believe that the cattle feeders in Colorado and in the nation should do all within their power to control such public problems as runoff, odor and dust. However, I believe it totally unrealistic to expect them to do that which no municipality can do -- treat and purify the storm runoff waters.

I sincerely hope that this has stated my position and the position of the cattle feeding industry. I am sure that Monfort Feed Lots will join the Colorado Cattle Feeders Association in working with any group that is interested in solving this problem. You must realize that not only do we as people consume the waters of the State, but we also have thousands upon thousands of cattle consuming millions of gallons of water that must be pure for us to survive economically.

K. Monfort

Sincerely,

(Signed) Kenneth Monfort

Kenneth Monfort, Vice President

Monfort Feed Lots, Inc.

* * * * *

GEORGE MANCINI FEED LOTS, INC.

P.O. BOX 398

Brighton, Colorado

April 27, 1966

South Platte River Basin Conference

State Capitol Building, Denver, Colorado

Re: The pumping and piping of wastes drainage to surface streams

Our firm will cooperate to its full capabilities to alleviate or completely rectify this problem. Certainly all control agencies and engineering knowhow will be made available to those with the problem to achieve the best correction at reasonable costs.

Re: Overland surface drainage to surface streams.

Again our firm will cooperate with all reasonable advice and methods to as best possible correct this problem. As to reducing odors to a minimum we are currently and regularly striving to compact the wastes into proper storage mounds so as to shut off oxidization as much as possible so

K. Monfort

as to minimize odors. Yearly these storage mounds will be moved out to farm lands to be plowed under. As new techniques become proven for application of deodorizers, etc., we pledge cooperation to the fullest.

George Mancini Feed Lots, Inc.

(Signed) George Mancini

By: George Mancini, Pres.

* * * * *

THOMAS A. RICHARDSON

ATTORNEY AT LAW

Harvard Building

922½ Ninth Avenue

Greeley, Colorado

April 21, 1966

Mr. Roy L. Cleere, M. C., M. P. H.

Director of Public Health

State of Colorado

Department of Public Health

4210 East 11th Avenue

Denver, Colorado

Dear Mr. Cleere:

Farr Farms Feed Lots of Greeley, Colorado, welcome

K. Monfort

this opportunity to discuss with you the progress being made by us in the management of our feed lots in solving the pollution problem being experienced in the South Platte River Basin.

Our feed lots are east of Greeley, located on both sides of the Cache La Poudre River. The older portion of our lots are located on the south side of the river, while the new portion of our lots are on the north side of the river.

In the area of the older lots, the ground has been graded to drain from the south to the north. This area drains into an underground storm sewer or drain, and is carried completely underground to the river. All pens drain by laterals into the main drain line which is buried in the barrow pit; said main drain is approximately one-half mile long. The only time, however, that this drainage line carries water is after a heavy storm, and then only for a short period of time. During the time that it flows into the river, the river is high and carrying a large amount of water. Thus, any water draining into the river from the feed lots is diluted by the large flow in the river.

Inasmuch as the feed lots are located on both sides of the river, the cattle are fenced from the river and not allowed to cross or wade in the stream. In addition, there are dikes along the river bank on both sides, which prevent

K. Monfort

any surface water from the feed lot pens flowing into the river.

The new area being prepared for feed lots, consisting of 40 acres, more or less, has been graded to drain each feed lot properly. By thorough planning of the building of future pens, keeping in mind the problems of drainage, we are preventing any future water from the pens reaching the river to cause a pollution problem.

In our opinion, one of the major factors causing pollution and odor from feed lots is improper cleaning. We clean our pens on the average of every six weeks. We pile the manure and haul it away as soon as possible. We keep our pens dry through proper drainage, and we do not overload the pen capacity. When a pen has been cleaned, the manure is piled and dirt is hauled into the pens to prevent large holes from developing and holding stagnant water. This is a continuous process in our housekeeping operation.

In order to carry out this method of anti-odor and pollution control, we have two road graders, two rubber tire loaders, three dump trucks and twelve farm trucks. We have spent thousands of dollars for equipment, storm drains and land leveling in order to meet and solve the problems of pollution.

K. Monfort

We are awaiting the proposed legislation which will license feed lot operations. These regulations will be suggested by feed lot operators, and we will be policing our own operations. This will be of great help in the control of pollution problems throughout the entire State.

We feel that Farr Farms Feed Lots have over the years, and still are continuing, cooperated in solving the problems of stream pollution and odors. We are accomplishing this by the following steps:

- (1) Installation of an underground system of storm drains which removes all surface water and keeps the pens dry.
- (2) These drains deliver water to the river only at times when the river has an abundance of water in it, and said waste water is diluted because of the heavy flow in the river.
- (3) Preventing the cattle from crossing the river, standing in the river or bedding down on the banks of the river eliminates a direct pollution problem.
- (4) A system of dikes along the river banks prevent any surface water from the cattle pens entering the stream.
- (5) In planning the new area for feed lots, it has been done with proper land leveling so that all future lots will drain in such a manner as not to pollute the stream.

K. Monfort

(6) By following proper housekeeping procedures, such as continuous removal of manure, keeping pens dry and hauling dirt to keep the holes filled to prevent odors and add to the control of pollution.

(7) All of these steps can be carried out and are being carried out with heavy equipment, such as dump trucks, bull dozers and road graders.

Briefly, we have tried to outline the programs followed at our feed lots which have been and will continue to be used in the abatement of the problems of pollution and the reduction of odors.

Respectfully submitted,

FARR FARMS, INC.

By: (Signed) Wm. R. Farr

Vice-President

Approved as to form:

(Signed) Thomas A. Richardson

Thomas A. Richardson, Attorney

* * * * *

WEISBART & CO.

BRUSH, COLO.

April 21, 1966

State of Colorado

Dept. of Public Health

R. L. Cleere, M. D., M.P.H.

Director of Public Health

Dear Sir:

In reply to your letter concerning water pollution on the South Platte River Basin, I would like to list briefly the steps Weisbart & Co. Feedlots, Brush, Colo. have taken to improve our situation in this matter.

Our problems are mainly in four category's:

1. Accumulation of manure and animal wastes.
2. Surface drainage of water following periods of heavy rainfall.
3. Odor control of feedlot residues.
4. Rodent and insect control.

In 1965 to date we have pushed into piles in our lots, all accumulated manure and wastes. We have removed in excess of 35,000 tons from these piles to various farms in the area. We plan to remove all manure at least once and possibly twice each year, as well as keeping the manure from the lots pushed into mounds.

We have made arrangements with local farmers to pump excess water into flowing irrigation ditches at such times as it can be used as fertilizer on the growing crops. We have also arranged to pump into low lying areas in adjoining lands which are unused and well away from dwellings. These we plan to develop into lagoons that can be chemically treated.

K. Monfort

We have started an odor control program of spraying all areas with a commercial deodorant as prescribed by the manufacturer of said product. This is working very satisfactorily.

We have placed the entire lot under contract with a rodent exterminator company and after one year have virtually 100% control of rats and other rodent type animals. We are also working with the University of Colorado on several types of insect control programs and are having very good luck in this field.

Our intentions at this time are to continue to improve our efforts in all aspects of pollution control and will welcome any recommendations or suggestions to better these procedures.

Sincerely

Weisbart & Co.

(Signed) Steve Treadway Manager Owner

* * * * *

TO: Greeley Odor Committee

FROM: Monfort Feed Lots; Kenneth Monfort, Vice-President

SUBJECT: Odor control measures accomplished, initiated,
authorized and contemplated.

K. Monfort

We at Monfort Feed Lots are pleased that this meeting has been called at this time to give us a chance to report on our progress, our problems, and to ask some community assistance. I would like to start my report by asking you to allow me to tell you some of the measures we are using in an attempt to control this problem. I will apologize for the use of dollar figures. I realize that they do not mean much as far as odor control is concerned except that they do point to the fact that we view the problem seriously and are trying to combat the problem not only with talk and thoughts but with cash expenditures. I will list several ways in which we are attempting to attack the problem.

1. Housekeeping. We believe that this is by far the most important measure that we can accomplish with the knowledge that we have today. We currently have equipment valued at \$237,000 employed in this effort on a six-day a week basis. This includes two Caterpillar 966 loaders, four bulldozers, one motor grader and five large dump trucks. Since last fall, we have loaded out over 250,000 tons of manure. The bulk of this has been sold to farmers in the area altho a large portion has been given to farmers who had previously purchased manure from us. We have also started stockpiling some manure on land that is adjacent to the Feedlot. We have been filling

K. Monfort

or resurfacing many of our pens with dirt to provide for better drainage, etc. We have hauled in an estimated 60,000 tons this year. The cost on this operation is approximately \$1.00 per ton. We believe that this procedure will accomplish much in improving our "housekeeping" problems at the Feed Lots.

The time of year is such that we will no longer be able to sell manure to the farmers. We are currently as clean as we normally are when we cease this operation. However, we have determined that we will continue to haul manure to our stockpile, clean pens, and refill with dirt throughout the summer as weather permits. This operation is estimated to cost \$7,700 per week. We hope that the better condition of the pens and therefore the better and more efficient gain of the cattle will partially repay the costs. However, truthfully, it is very apparent to us that the bulk of these costs must be charged to Odor Control.

In conjunction with these "housekeeping" measures, we have purchased a farm directly south of the Feed Lots. To set your minds at ease, this purchase was for the express purpose of obtaining a ready source of dirt for continuation in years to come of the program that we are using now. There will be no feeding on this farm.

A word of warning. We honestly believe that these "housekeeping" measures will significantly reduce the odor

K. Monfort

problem from our Feed Lot in a normal year. However, we believe the results will be minor in an extremely wet summer such as we experienced last year. The solution to a repeat of 1965 must be found elsewhere.

We would also like to note that in other areas where odor from Feedlots and Dairying operations have been a problem, acceptable solutions have come about from such "housekeeping" measures as I have mentioned. Normally these methods are used at the direction of the courts or to conform with city, county, or State ordinances.

2. Research Project. Attached to this report, you will find copies of an agreement between ourselves and Colorado State University. This is the start of what we believe will be a significant research project by the University. As you will note, our financial support of this project is to date rather meager, yet it is all that they have. Our discussions with officials of the University have been frequent and they are eager to attack the problem altho they are realistic in their evaluation that it is an extremely complex and difficult problem. You will note that we are to receive a report showing a complete study plan and proposed budget by May 15, 1966. This date was chosen for several reasons.

- (1) It was as soon as they could accomplish this part of the study with the limited help that

K. Monfort

they could spare for even this preliminary part.

(2) This is the date that they must have a proposal ready for submission to U. S. Public Health officials.

(3) This is near the start of the "odor season" and we insisted that we must have something to tell and show the people of our community.

It is our hope that others interested in the problem will assist us in the financial part of this study after the preliminary work is completed. We specifically will hope for help from the U. S. Public Health people and the State of Colorado. However, we rather obviously would also look with favor upon any support from the City of Greeley, the Greeley Chamber of Commerce, Weld County or other cattle feeders. We are sure that this "underwriting" of basic odor research is a first anywhere in the country. We would welcome those who would like to get on the bandwagon.

At this time, Dr. S. M. Morrisson, head of the Microbiology Department of the School of Veterinary Medicine is heading the study. It will undoubtedly involve many other capable scientists throughout many departments and schools at the University. It is my hope that at some future meeting Dr. Morrisson and others from C.S.U. will be able to attend one of these meetings and report their program to those of you who are interested.

K. Monfort

3. Experimental Procedures: We have, in the past six months, installed six experimental pens surfaced with cement and asphalt. We did this in an effort to determine whether we could feasibly feed cattle on these hard surfaces which are easily cleaned and therefore probably less susceptible to odor forming bacteria. To date our experimental results have been negative enough on gain to make this project appear unfeasible. We will continue this experimental work through the summer, however, to be sure of our results. The cost of these pens was close to \$50,000 so rather obviously we are disappointed.

Another experimental program is the installation of a drainage tile at a cost of \$8,000 that we hope will drain certain low parts of the Feedlots where water has collected in the past. Moisture since installation has been insufficient to test this approach altho we are sure that it will be of immense value in the rainy season. If it works well enough, we will pursue this type of construction to a point where we would someday have a rather complete storm drainage system.

4. Dust Control: We are continuing to add sprinklers and well capacity as we expand the lots to assure ourselves of continued dust control. We will this summer, if need be, sprinkle on a 7-day, 24-hour basis to control the dust. In years past, we believed this to be our most serious problem

K. Monfort

and would undoubtedly still consider it so if it had not been eliminated.

It should be of interest to note that this problem of dust is the only problem covered in the recently enacted Air Pollution bill that deals with Feed Lots. The dust from Feedlots is considered by experts as the only physically harmful effect of Feedlots. We are pleased to note that this should never be a problem in our community caused by Monfort Feed Lots.

5. Masking or Inhibiting Agents: We are in the final phase of determining which of numerous masking and inhibiting agents will be tested this summer at the Feed Lots. In all probability we will test as many as three different compounds. These products will probably be applied to the Feed Lots from an aerial sprayer, either airplane or helicopter. We believe that our biggest problem will be the determination of effectiveness or lack of effectiveness. Therefore, we would like to ask this Committee to set up a "smell panel" to help us in the determination of the effectiveness of these products and other control measures that we have instigated. We would ask that this committee be composed of at least ten people in various areas of Greeley. We would ask that they keep records of their evaluation of odors on a three or four times per day basis. We would ask that these people be reliable, interested

K. Monfort

in the problem and our attempt to find solutions, and have average noses. (i.e. Not average in size or looks, but in smellability.) We would further ask that this committee set up this panel, tabulate the results and correlate these results with the information that we will provide the Committee in regard to our control measures. We believe that such a panel will eventually be extremely worthwhile when the researchers from C.S.U. become more deeply involved in the picture.

6. Economic Study: Each year, we have numerous out-of-town and particularly out-of-State visitors to the Feed Lots. This summer, we will set up a tourist information booth at the entrance to the Feedlots. We will give visitors a small brochure on the operations of the Feed Lot. At the same time, we would like to keep track of the number of visitors, their origin and their destination. In addition, we would like to have their comments on the Feed Lots and their reaction to it. I also think it would be of interest to see how many of these people spent time and money in Greeley and whether the Feed Lot had anything to do with their being in Greeley. The figures we collect will undoubtedly be ripe for suspicion so we would be more than happy to turn this project over to the Chamber of Commerce or the City if they would like to pick up the tab in exchange for completely impartial information. In any event, we would appreciate help on the development of a questionnaire.

K. Monfort

7. Feed Lot Sanitation Law: We continue to push, through the Cattle Feeders Association, for a State Feed Lot Sanitation Law. The Association has appointed a top-flight Committee to work on this law and has retained excellent legal counsel. I am pleased to report that the consensus of the Committee is that we must have this regulation and that if it is an easy law to live with it will be ineffective. I am sure that we can look forward to having such a law on the books next year which will assure you people that we and other cattle feeders like ourselves will live up to that which we are now promising.

8. Other Problems: Other problems, not connected directly with odor but in the "nuisance" field are also being worked on at the Feed Lots. These would include such items as:

- (1) Insect control.
- (2) Rodent control.
- (3) Disease control.
- (4) Water runoff control.

The first three items of these four are under the direct supervision and control of our two full-time veterinarians. Insect and rodent control we believe has been very effective. We undoubtedly had the largest insect population last August and September that we have had in recent years.

K. Monfort

This problem was directly attributable to the June floods and the tremendous increase in insect population throughout the eastern portion of the State. Altho our problem at the Feed Lot was aggravated by this great increase in insect population, it could not compare with the problems throughout the Sterling and Fort Morgan area in Northern Colorado and the entire Arkansas River Valley. The problem throughout the flooded portions of the State was serious enough that the Federal Government made grants in excess of \$100,000 to aid the State and local governments with this problem. In line with this State-wide problem, we feel that our problem was minor. We continued our past ground spraying practices and instituted an aerial spraying program in late August and early September. This program along with our successful rodent control program will be continued and accelerated should the need arise.

We believe that our staff of veterinarians and lay health inspectors give us the best possible control of animal disease in any Feed Lot. We are constantly on the lookout for any and all diseases that might affect not only the cattle but humans ~~which~~ might be affected. We work very closely with the disease prevention division of the Department of Agriculture and with C.S.U. which has the nation's top Veterinary School. In return for certain lab work and consultation privileges at

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C.S.U., we conduct "on-the-job" training courses for every senior veterinary student at the University. We believe that this close relationship with the USDA and C.S.U. coupled with our excellent staff gives us the best in disease control and treatment.

The fourth "other problem" mentioned is that of water runoff control. In years past, this problem was second only to our aforementioned dust problem. However, by grading and the building of collection basins and ditches and tiles, we believe that we have completely solved this problem. In any event, the problem did not exist last summer which was our biggest rainfall summer in history, and we have reason to believe that it need not exist again.

I hope and trust that this report is adequate and that it shows that we are making every conceivable effort to alleviate the problems that we have had in the past. I think it only fair to reiterate that our success or failure will depend to a certain extent on the season we will have this coming summer. Moisture aggravates our problem tremendously. An abnormally dry summer will alleviate the problem. Our control program will, we believe, show significant results this summer and in years to come. We have been extremely fortunate that this year has been a good feeding year and that we can therefore afford to spend the money that is

K. Monfort

necessary to solve as much of the problem as possible. We cannot expect every year to be as good and to afford us the wherewithal to attack on such a large front. Therefore, our chief hope is the hope that the basic research that we are sponsoring at C.S.U. will lead us to an acceptable yet economic solution to our problem. We will appreciate any help or any comments. Rather obviously, we desire to be an asset to the community -- not a liability. We desire to be a good, well-thought-of neighbor, not a target for abuse and lawsuits. Our problem, therefore, cannot be one of intent but must rather be one of "how." We will appreciate any help.

* * * * *

between

MONFORT FEED LOTS, INC.

Route 2, Greeley, Colo.

and

COLORADO STATE UNIVERSITY

Fort Collins, Colorado

This constitutes a formal Memorandum of Agreement entered into by Monfort Feed Lots, Inc. (hereinafter referred to as Monfort) and Colorado State University (hereinafter referred to as CSU) for the purpose of conducting a feasibility

K. Monfort

study on "Feedlot Solid Waste Control." The period of the study will be approximately February 5, 1966, to May 30, 1966.

Monfort agrees to support the study for an amount of \$600 to partially cover the cost of travel of CSU personnel to regional meetings at Davis, California and Ann Arbor, Michigan, labor for a preliminary library search to determine existing knowledge on the subject and preliminary program planning. CSU will not charge an overhead cost on this initial feasibility study.

CSU agrees to exert its best efforts to search the field for existing knowledge and will submit a report to Monfort on or about May 15, 1966. The report will include a proposed study plan and budget for future research.

CSU and Monfort agree that any publicity releases concerning the project must be approved by both parties prior to publication.

(Signed) W. E. Morgan, 2/18/66

W. E. Morgan, President

Colorado State University

(Signed) Kenneth Monfort

Monfort Feed Lots, Inc.

Vice Pres.

* * * * *

K. Monfort

MR. STEIN: I don't want to anticipate, but I am glancing at the report, and this obviously, at this point, is out of order.

Would you agree, as I see it, there are three problems with feedlots:

1. Either you pipe or pump waste into a stream;
2. You may have normal runoff and you have to anticipate a rain some time or another; and
3. We may have extraordinary conditions, as we had here last June, or in times of flood.

I think we can handle the latter first. I saw the roads and your bridges after the floods. I don't think it is expected that anyone in a reasonable operation would expect waste treatment facilities to be designed to handle those conditions. I think we can agree on that.

But again, I would like to say, Senator, that I don't know that the flood conditions that you had last June are typical of the conditions we have here. Would you agree that feedlots should not pump or pipe wastes to surface waters?

MR. MONFORT: Personally, I would not agree. The question involved here, of course, is: Is the pumping and piping in lieu of what natural drainage would occur?

K. Monfort

For instance, I will cite the best example I know, which is our own feedlot.

MR. STEIN: Yes.

MR. MONFORT: At our feedlot we have constructed some catch basins to catch this runoff.

I would like to mention that over past years we have determined that it takes about three-quarters of an inch of rain at one time in a two or three-hour period to get this runoff. We have constructed these catch basins to catch this, so that this runoff will not inundate our neighbors, you might say.

Now, if we had not constructed these, it would have gone through our neighbor's property and into the river. So, basically, what we have done is construct the basins, and then allowed it to be piped into the river, where it would have gone anyway.

MR. STEIN: The next question is: I don't know whether we can equate -- or maybe you think we should the acreage of a feedlot to indicate the normal storm drainage or rain drainage from a feedlot to a city like Denver.

This is a situation in terms of the remedial measures of the problem we have. In Denver a feedlot may be a little different, or don't you agree?

K. Monfort

As I understand your talk, you didn't think that the feedlots should be responsible for storm water runoff. I would say possibly that is so in a storm like you had last June, but how about ordinary rains?

MR. MONFORT: Well, ordinary rains, we will average this water running off of our feedlot maybe once, maybe twice a summer, but this is nothing that is constant. As I say, it takes a rather large rain before we get any runoff at all.

Now, can you equate a feedlot with the City of Denver? Well, perhaps not. But maybe the City of Windsor or the City of Milliken we could. As far as acreage goes and as far as amounts of runoff, I think this could be quite possible.

MR. STEIN: Well, the recommendations -- and I would like your comments -- or maybe you don't want them now and I can possibly understand your view on that -- in the recommendations of our investigators, which is what we are considering and which will come up later again, they have indicated that there are four feedlots which pump or pipe waste drainage to the surface streams. They say these are the Monfort feedlot in Greeley, and I think you have confirmed that --

MR. MONFORT: I am familiar with that.

K. Monfort

MR. STEIN: The Farr Farms feedlot in Greeley, the Weisbart feedlot in Brush, and the Mancini feedlot in Brighton.

In addition to that, they say there are seven feedlots which have overland drainage to surface streams. These are the Western Beef feedlot in Denver, the Farr Farms feedlot in Greeley, the Mancini feedlot in Brighton, the National Food Company feedlot in Brighton, the Mountain View Angus Ranch feedlot in Platteville, the Ludlow Cattle Company feedlot in Longmont, and the Tittle feedlot north of Greeley.

The recommendation here is that the ones that pipe shall initiate plans to design and construct adequate treatment facilities such as the use of lined lagoons, or treat these wastes by equivalent means to prevent the pollution of both surface and underground water resources, and the ones that have overland drainage institute drainage facilities to divert the surface runoff to lined lagoons or treat these wastes; and there is an overlap in the feedlots.

The recommendation is that waste abatement requirements for these nine feedlots are to be developed before January 1, 1967, and that necessary feedlot waste handling and waste treatment facilities shall be constructed before January 1, 1968. This is their recommendation.

K. Monfort

Do you have any comment on the recommendation for these nine feedlots to stop runoff surface waters either by piping, pumping or overland drainage?

MR. MONFORT: That is what my remarks were aimed at. This was part of the recommendation that was written to us as individuals.

It is my feeling that the feedlot industry at this point cannot do this.

For instance, we have talked to a sewage engineer on our feedlot, and we have calculated the runoff on a two-inch rain, which is a rather large rain for our area, and then we asked him to calculate how big a lagoon it would take to handle this. He calculated that it would be something in the neighborhood of a four to five hundred acre lagoon to take care of this runoff.

Now, perhaps his calculations are off, or perhaps there are other ways of treating the problem, but basically I think the feedlots, and these are not small open operations that you have been mentioning, do suffer from the same problem during the heavy storms as would the City of Denver, or as would any other city. There are acres and acres of land where there is nothing in particular to hold the water, and the runoff is tremendous.

K. Monfort

Now, how you go about treating it is a question, and how much you can afford to construct treatment facilities for something you need maybe once or twice a year, is another question.

MR. STEIN: Well, the recommendation in the report, though, is that feedlots cause water pollution problems. In other river basins where these wastes are discharged in slugs to small water courses, fish kills have occurred.

Disease hazards are associated with the bacteriological pollution of surface streams by swine and beef cattle manure in the South Platte River Basin. This is what the report says.

They talk about diseases animal to animal, animal to man, downstream swimming and water contact sports, pollution of irrigated vegetables, such as lettuce and celery, by irrigation water from polluted streams, and they talk about occupational hazards.

They talk about the water-borne diseases, pollution by oxygen-demanding materials, and so forth, and pollution of surface water resources caused by feedlot wastes is now occurring at several places throughout the South Platte River Basin. Feedlot drainage is presently being pumped, or piped, directly to surface streams, and in other cases overland surface drainage from feedlots is reaching the streams.

They say basically, the environmental control of feedlot waste problems includes the prevention of surface runoff pollution, ground-water pollution, odors, and housefly production in the manure.

As I understand your position, the feedlot industry, in spite of this report, indicates that they don't think you should do anything further to prevent the runoff to the stream?

MR. MONFORT: Well, I don't think that is what I mean to be saying. I think what I mean to be saying is that currently we do not know what we can do.

We are more than happy to work with anyone in trying to figure this out, but to say that we would have this problem controlled by January 1st of 1967 or 1968 to me would be rather unrealistic. This deals only with the runoff.

Now, I do want to emphasize that this occurs only when there is heavy precipitation, where all of this other runoff is coming from countless other agricultural areas, countless urban areas, rivers are at their high, and so the percentage is probably relatively small.

I am sure you people know this more than we do.

MR. STEIN: Senator, I don't want to belabor this point, but I do think that years ago this was the

theory in the United States:

We had these combined sewers, and the notion was that during stormwater runoff we wouldn't treat but send wastes to the streams. We found out, as the country grew, that this became a very acute problem. As a matter of fact, the Congress in 1965 appropriated \$20 million a year for the next four years just to deal with this problem.

Now, I don't think in 1966 -- and maybe this is what you are saying -- what I am hearing is the theory and the philosophy that we had before 1920, that during high periods of runoff or intermittent periods of rain, the runoff in the dilution was coming from all the sources, and we should just discharge the wastes to the stream.

The point is, in doing that in various parts of the country, we found ourselves with grossly polluted streams.

Now, I have no view on this yet, but our people did come up with recommendations in the report of a solution, or a possible solution, to the feedlot problem, and that is to construct lined lagoons or treat the wastes.

As I understand your position, you are not prepared to do that at the deadline, and you are not sure you can do that at all.

MR. MONFORT: Well, I am sure it could be

K. Monfort

accomplished.

You mentioned the \$20 million figure. I think if this were made available to the feedlot industry in Colorado, this would probably just about take care of it.

MR. STEIN: No. This \$20 million figure relates to all cities, big cities, like New York, Boston, and so forth.

I imagine they would consider the feedlot problem compared to the problem of your stormwater runoff which you have in Denver with all the streets paved here, and the stormwater problem you have in New York, Philadelphia, Boston, and Chicago, to be minimal, considering the area you have around the feedlots.

I think the question here is whether we are going to deal with all sources of pollution. We are not drawing any judgments at this point, but I would like your views on what you think the feedlot industry might be able to do.

Do you think you are doing all you can, or you can do more?

MR. MONFORT: Well, I am sure we always think we are doing all we can, and yet we always find that we can do more.

I think the feedlot industry would be most

K. Monfort

willing to work with your group, or with the State Water Pollution Commission, in this regard, to try to figure out the best ways to do this.

I am sure that within our industry itself, we do not have the knowledge or the expertise to be able to accomplish this rather large order, you might say, overnight. So I think it is something where surely we are more than glad to work with people on it.

Maybe I am making the problem look too large, but basically it would be a big problem for each feedlot in the State or in the northern part of the State to treat this runoff water.

I think I might as well mention that the seven or eight or ten that you mentioned are probably just the beginning of the problem. I think that as this study goes on and the State gets more deeply involved in the problem, they will find there are many other feedlots in the same category.

This is going to be a big problem.

MR. STEIN: Are there any other comments or questions?

(No response.)

MR. STEIN: Well, thank you, Senator.

Mr. Monfort, before you leave, the

conferees will be considering this. I wonder if you could take the trouble to look at the recommendations, if you can get them, or have your industry look at them. We will be here tomorrow.

If we can get your comments on the specific recommendations which we might have, this might be helpful to us in evaluating the problem.

I would recommend that you might see Mr. Bauer, get a specific set of the recommendations, and look them over and see if we can have your views.

MR. MONFORT: Fine. We were sort of in the dark on this.

MR. STEIN: Right. Thank you very much.

Mr. Struzeski, would you continue, please?

E. J. Struzeski

FURTHER STATEMENT OF E. J. STRUZESKI,
CHIEF, POLLUTION DAMAGE ASSESSMENT
SECTION, SOUTH PLATTE RIVER BASIN
PROJECT, REGION VIII, WATER POLLUTION
CONTROL ADMINISTRATION, DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE, DENVER,
COLORADO

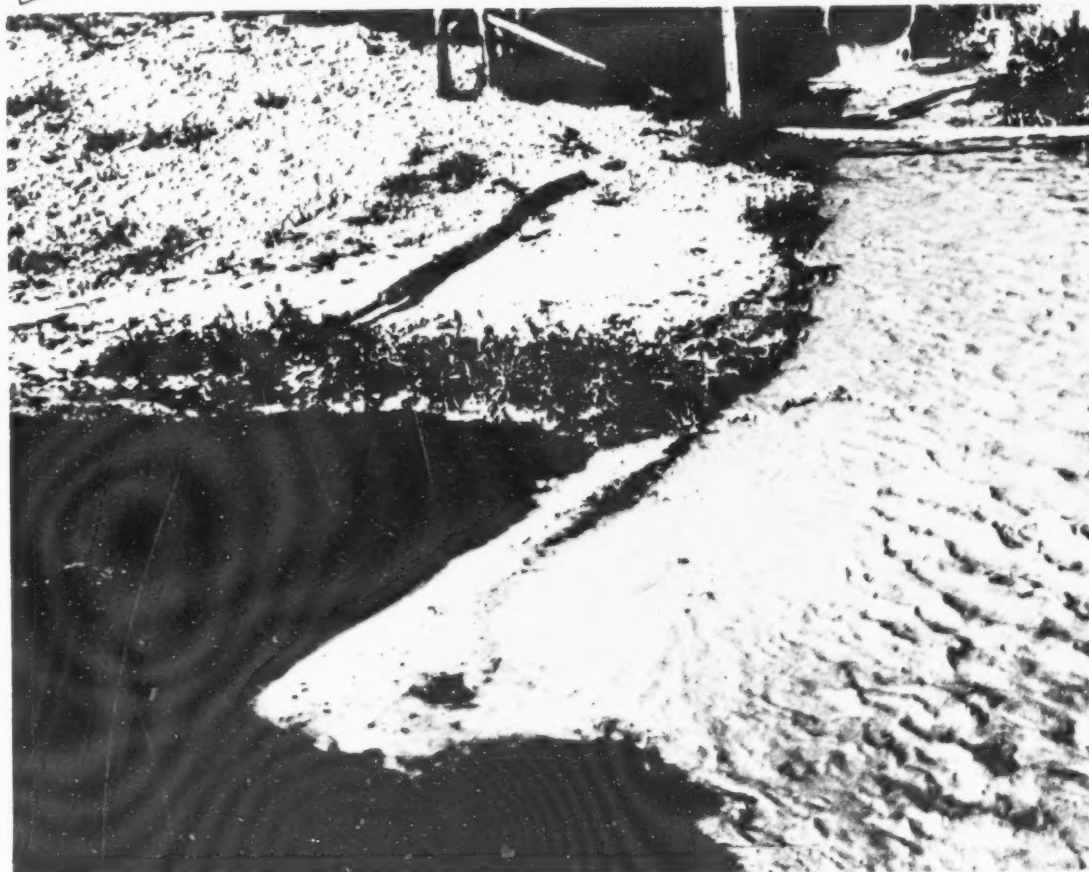
MR. STRUZESKI: Thank you, Mr. Stein.

The last part of the presentation concerns biological findings and further bacteriological aspects of waste pollution. The biological findings consider algae, slime growths, stream bottom animals and fishlife.

In unpolluted flowing water, bottom-attached algae are very desirable as a primary source of food for aquatic animal life, and algae also provide photosynthetic oxygen for a healthy stream. Analyses indicate that the presence of sugar beet wastes: 1) greatly reduced the growth of attached algae within the streams affected; and 2) is the primary cause of reduced algae production. Figure 24, included in your hand-out, is an illustration of the solids contained in the Longmont sugar beet effluent which discharges to St. Vrain Creek.

(Figure 24 is as follows:)

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PHOTOGRAPH OF WASTE EFFLUENT FROM THE LONGMONT SUGAR BEET MILL
ILLUSTRATING LARGE QUANTITIES OF SUSPENDED SOLIDS DISCHARGED
OCTOBER, 1964

FIGURE 24

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These solids reduce the penetration of light, thereby limiting the energy available for photosynthesis and also smothering the algal cells present in the stream. These wastes are exceptionally detrimental if they contain high BOD content in addition to suspended solids. The destruction of algae reduces photosynthetic oxygen available for biochemical decomposition which in turn extends the distance downstream before which stream recovery can occur.

Slime growths were found below all sugar beet waste discharges. Suspended slime growths floating downstream, slime covered rocks and logs are esthetically revolting to both sight and touch. Slime growths increase with BOD in the stream but are reduced by extremely high levels of suspended solids. The Johnstown Monosodium Glutamate-sugar recovery plant discharged a waste that nurtured intense slime growths in the Little Thompson River continuously throughout the year. These growths were carried downstream into the lower Big Thompson River, where they died and settled forming dense black organic sludges covering the bottom of the river. Waste discharges from the Loveland sugar mill stimulated the growth of slimes that covered the stream below this location as a thick blanket. White slime growths were found overlying the dense black organic sludges. Slime growths also directly

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or indirectly destroy animal life in the stream. Figure 25, included in your hand-out, shows the slime growths accumulated on a crayfish collected from the South Platte River at Kersey.

(Figure 25 is as follows:)

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PHOTOGRAPH OF CRAYFISH OVERGROWN WITH SLIMES.
SOUTH PLATTE RIVER, KERSEY, COLORADO
OCTOBER, 1964.

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MR. STRUZESKI: These growths caused by high levels of sugar beet wastes were in the process of overgrowing the crayfish's gills, leading to suffocation.

During the sugar beet processing campaign, there was general elimination of the sensitive bottom animals and also the tolerant sludgeworms directly below the sugar beet mill at Sterling. This was primarily caused by the excessive quantities of organic solids discharged into the streams. Figure 27 in your hand-out shows the very large amounts of sugar beet particles and chunks that were floating in St. Vrain Creek below the Longmont sugar mill.

(Figure 27 is as follows:)



SUSPENDED CHUNKS OF SUGAR BEETS, ST. VRAIN CREEK, OCTOBER, 1964: (1) ABOVE LONGMONT, COLORADO; (2) U.S. HIGHWAY 87 BELOW LONGMONT; (3) 1 MILE ABOVE CONFLUENCE WITH SOUTH PLATTE RIVER; (4) SOUTH PLATTE RIVER, HIGHWAY 60 (MATERIAL RETAINED IN A NET WITH A SQUARE-FOOT OPENING EXPOSED TO THE CURRENT FOR ONE MINUTE).

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In addition, beet chunks were found covering the stream bottom and rolling along as part of the bed load.

Large increase in noxious insects in both winter and summer was noted downstream of each sugar beet mill, feeding on the beet solids and other organic matter present. These organisms are also related to a greater incidence of disease transmission.

The sugar beet wastes trapped in pools, off channel areas and irrigation canals, and the organic material in bottom sludge deposits greatly promote mosquito and other insect production. Odors are also produced.

Limited study was made of the fishery resources existing at the present time in the South Platte River Basin. At various times during 1963 and 1964, fish were observed at many of the sampling stations, but the majority were carp, suckers, and many top minnows. Game fish, such as bass and sunfishes, were rarely seen. Under present conditions, the annual decimation of habitat by sugar beet wastes definitely limits the fish population and species found. With good water quality, the development of a good fishery resource in these streams would provide backyard recreation in the most densely populated river basin in Colorado, where this resource is in heavy demand.

The large number of total coliform, fecal

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coliform, and fecal streptococci bacteria in sugar beet wastes discharged to receiving streams has for some time been a matter of concern. Extensive bacterial studies were undertaken on the North Platte River in Wyoming and Nebraska in 1960, 1961, and 1962, below the 5 sugar beet mills between Torrington, Wyoming, and Bayard, Nebraska. Special laboratory investigations have been carried out by the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, from late 1963 to the present. Laboratory and field studies of the South Platte River Basin Project have dealt with the bacterial aspects of sugar beet pollution since late 1963. Additional study was undertaken in October 1965 by the United States Public Health Service of four sugar beet mills in Minnesota and North Dakota on the Red River of the North. The following discussion is based on the above studies:

Coliform bacteria universally occur in sanitary sewage. With a few exceptions, these bacteria are not harmful and have been used by regulatory agencies for many decades as an indicator of the probable presence of pathogenic organisms. Objections have been made to the use of total coliform densities in that their origin is not exclusively from fecal sources. While this is true, the *Eschericia* species comprising part of the total coliform

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group is derived exclusively from human or animal excreta and its presence is evidence of fecal contamination. A second indicator group, the fecal coliform bacteria, is almost exclusively derived from the guts of warm-blooded animals. Recently the fecal streptococci group has been accepted and used as a third indicator of warm-blooded animal pollution. This group is not known to multiply in surface waters and rarely occurs on surface soil or vegetation not contaminated by sewage. Bacterial studies of sugar beet wastes in the South Platte River Basin have relied upon use of the indicator groups, total coliform, fecal coliform, and fecal streptococci.

Salmonella is a genus of bacteria pathogenic to man and to warm-blooded animals. These pathogens are discharged from the intestines of infected man and animals. Because of disease-producing capabilities, their presence in receiving water constitutes a health hazard through contact with these waters. Recent techniques now make possible the isolation of these pathogens even at extremely low concentrations. *Salmonella* isolation was first used in the Red River of the North studies in October 1965.

The relationship between fecal coliform and fecal streptococci bacteria provides further indication of the origin of fecal pollution. Ratios of fecal coliform

to fecal streptococci that are greater than 2:1 generally indicate that pollution was primarily derived from domestic sewage. Ratios less than 1:1 indicate that the majority of pollution originated from the wastes of warm-blooded animals other than man, such as stockyard and dairy animals.

The bacterial densities found in the final waste discharges from the ten sugar beet factories in the South Platte River Basin are summarized in the following table, entitled "Bacterial Densities in Sugar Beet Plant Wastes." This table is also included in your hand-out.

(The table referred to is as follows:)

BACTERIAL DENSITIES IN SUGAR BEET PLANT WASTES

South Platte River Basin

	<u>Date</u>	<u>Total Coliform</u> <u>(MPN/100ml)</u>	<u>Fecal Coliform</u> <u>(MPN/100ml)</u>	<u>Fecal Strep</u> <u>(No./100ml)</u>
Brighton	1-65	19,500,000	4,100,000	11,000,000
Longmont	11-65	490,000	22,000	6,350,000
Loveland	1-64	2,700	590	---
Windsor	1-64	6,620,000	52,100	---
Eaton	11-65	33,000,000	640,000	57,500,000
Greeley	1-64	3,060,000	103,000	---
Fort Morgan	12-63	1,600,000	13,000	---
Sterling	12-63	17,100,000	251,000	---
Ovid	12-63	18,700,000	362,000	---
Johnstown	11-65			
Outfall A--				
Clean water sewer		13,000	4,900	160,000
Outfall B--				
Lagoon effluent		49,000,000	950,000	3,600

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Although the total coliform densities in the effluents are quite important, particular emphasis is placed upon the fecal coliform and fecal streptococci densities. These levels were high to very high with the exception of the Loveland mill discharge and waste outfalls A and B at the Johnstown plant. The low coliform densities at Loveland were caused by high pH values in the waste effluent of 10.1 to 10.5, which resulted in significant bacterial die-off. The Johnstown plant is quite unlike the other nine sugar mills in that it receives intermediate raw sugar from other factories and produces monosodium glutamate in addition to refined sugar. The bacterial picture at Johnstown is different because of the nature of the operations. Outfall A showed high fecal strep but low fecal coliform densities; whereas, the reverse was true for Outfall B.

The ratio of fecal coliform to fecal streptococci in waste from the Brighton, Longmont and Eaton mills were respectively 0.37, 0.003, and 0.01. These ratios, together with high fecal streptococci levels, definitely indicate that bacterial pollution was primarily derived from the fecal excreta of animals rather than from humans. In November 1965, the Project carried out further tests to identify the specific groups of fecal streptococci present

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in sugar beet wastes. Data were collected from the Eaton sugar mill and also from the town of Eaton sewage treatment plant. The sewage treatment plant effluent gave perspective on the fecal strep groups expected in domestic or human wastes. The treated domestic sewage showed 38 percent of the streptococci were of the enterococcus group, which are of human origin; 22 percent were of the strep equinis or strep salivarius group, which are of human or animal origin; 26 percent were the strep bovis species associated with animal origin; and 14 percent were undefined. On the other hand, the sugar beet waste contained entirely strep bovis. The strep bovis species is strongly associated with cattle and other domestic animal feces. Other investigators have shown that the excreta from cows contain 63 percent or more strep bovis together with other streptococci species. From these investigations it is concluded that animal manure, which is used to fertilize sugar beets, transmits large numbers of fecal microorganisms which are subsequently carried by the sugar beets into the processing plant. These organisms appear in the waste processing effluents and then in the Basin streams.

Direct sampling and recovery of pathogenic organisms in sugar beet wastes has been attempted in the Red River of the North study. Of three sugar beet mills

studied in that area, salmonella was found in the wastes from two of the plants -- in one case before the wastes entered the treatment pond and within the treatment pond in the second case. In addition, salmonella was found in the river below these sugar beet mills and municipal discharges.

The Red River of the North study also considered the survival rates of fecal coliform, fecal strep, and salmonella within the waste treatment ponds utilized by the sugar mills. Salmonella is an extremely persistent organism particularly at the lower temperatures encountered in the wintertime. It was indicated that nutrients contained in the wastes promoted the growth and multiplication of salmonella. To reduce the health hazard associated with these organisms, the nutrients would need to be reduced or eliminated.

Fecal coliforms have been found on field beets, in irrigation water, on dirt removed from the beets arriving at the plant, and on the dirt and trash adhering to the beets stockpiled at the plant site. Beets stored at the plant site and in outlying areas such as railroad sidings may be subjected to heavy rodent activity that increase fecal contamination. In the plant there may be growth of bacterial populations due to recycling of waste water and standing water.

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Sugar beets are known to be a complex mixture of various carbohydrates. These nutrients support longer survival of bacteria in the receiving stream. Thus, the longer survival time and possible regrowth of bacteria, including enteric pathogenic organisms, negates in part the natural capabilities of the stream in assimilating bacterial loads. Also, this extends the distance downstream for recovery to non-hazardous levels. It is concluded that a health hazard is involved in recreational uses of waters polluted by the bacteria in beet sugar wastes.

Nutrient levels may be significantly reduced by extended storage of sugar beet wastes. Following nutrient removal, disinfection will effectively reduce the residual organisms and will prevent aftergrowth of undesirable bacteria in the receiving stream. Proper disinfection of all sugar beet waste effluents is included in the recommendations for pollution abatement.

Notwithstanding minor changes in the last 12 or 18 months, this is the picture of water pollution in the Middle and the Lower South Platte River Basin as it stands today. In order to provide adequate water quality in the middle and lower portions of the South Platte River and its tributaries, for all legitimate uses, both present and future, a plan of waste abatement was formulated. Development

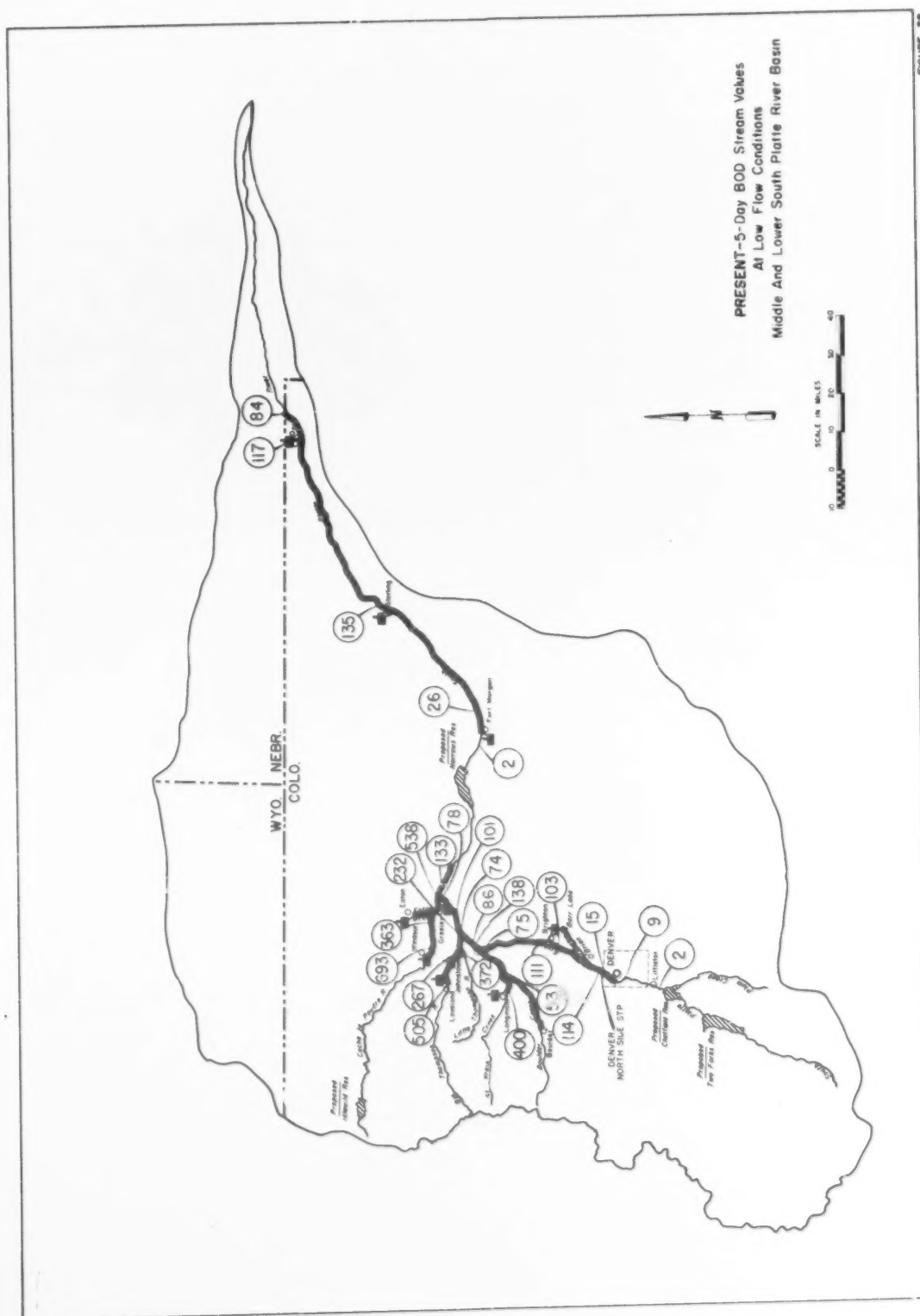
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of the plan consisted of three parts undertaken concurrently:

1. Establishing maximum allowable waste loads in the future that will guarantee stream water quality in conformance with the allowable objectives;
2. Evaluating technological and economic factors, and establishing a degree of waste treatment that is feasible for each waste source; and
3. Determining flow augmentation necessary for water quality control when the most efficient waste treatment, by itself, cannot satisfy the water quality objectives.

First, a picture was constructed of the most severe pollution that could be expected under present-day conditions. Then, with the pollution abatement plan in effective operation, situations were developed for the years 1972 and 2000 which approximate the most severe pollution that may be expected in the future. These conditions for the present, for the year 1972, and for the year 2000, in terms of 5-day BOD levels in the streams, are shown respectively in Figures 28, 29 and 30, which are included in your hand-out.

(Figures 28, 29 and 30 are as follows:)



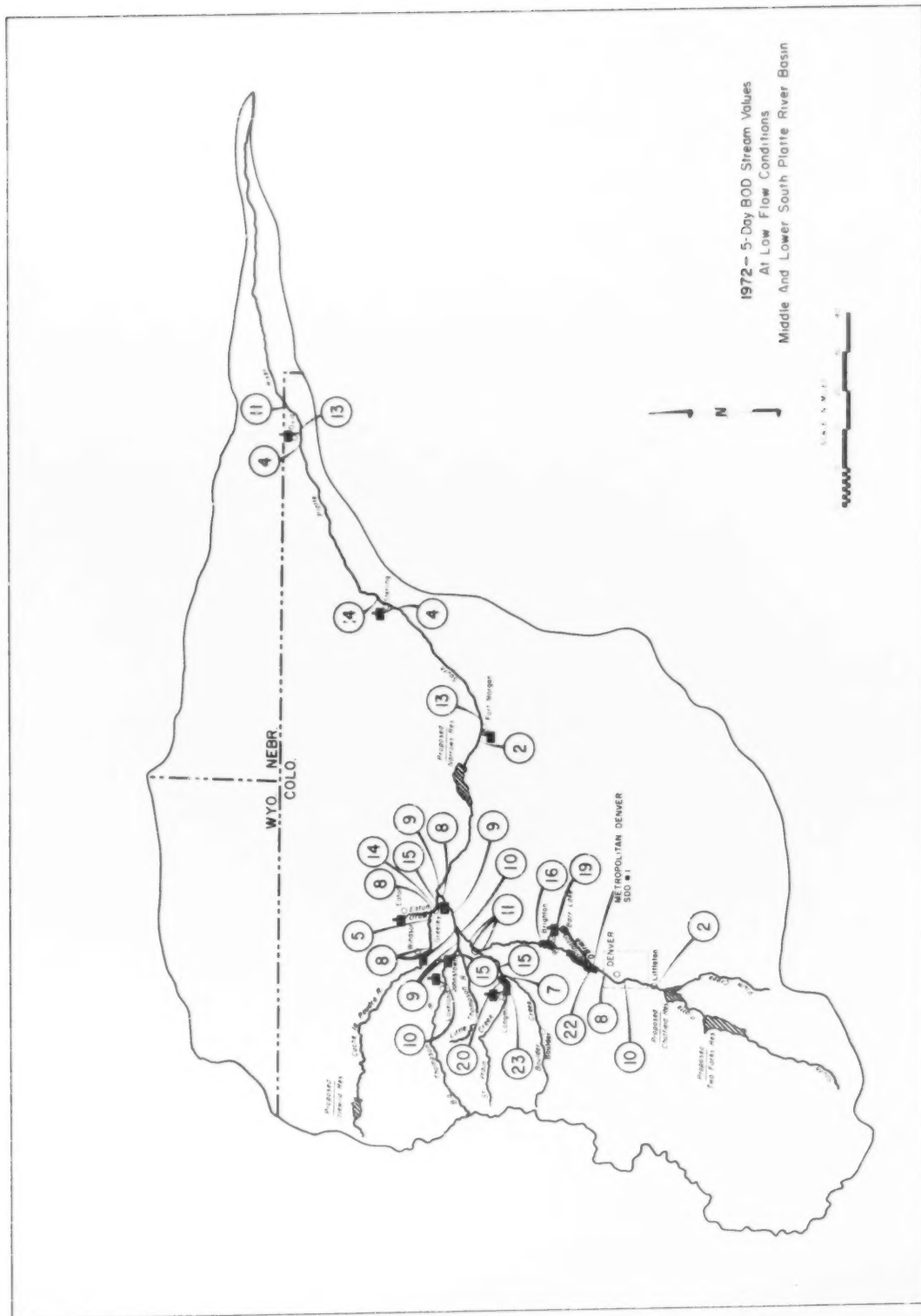


FIGURE 29

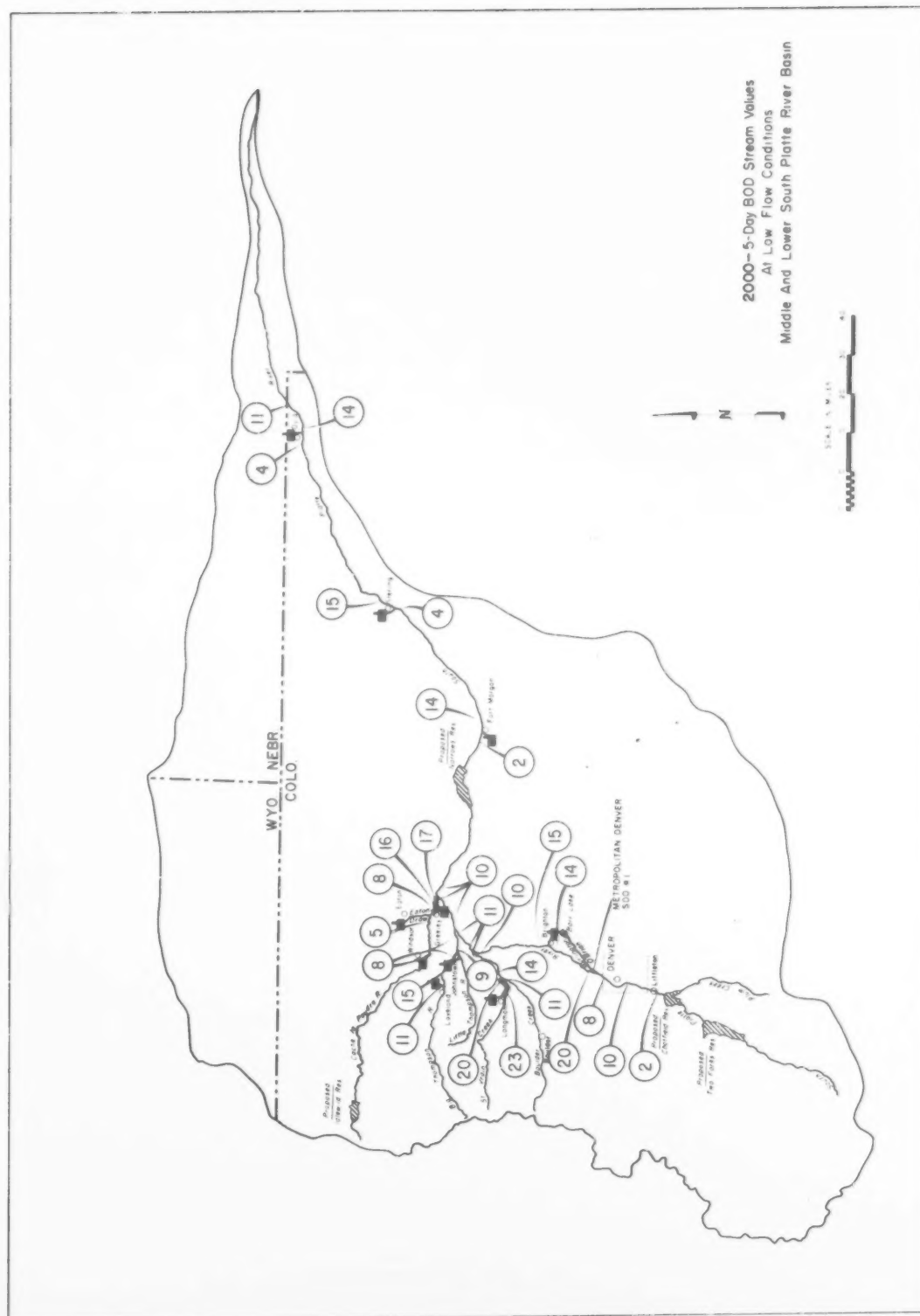


FIGURE 30

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MR. STRUZESKI: The pollution plan for the years 1972 and 2000 is designed to meet water quality objectives at all times except during the most severe periods. Limited stretches of stream may exceed, to some degree, the allowable levels, but these events should be of minor consequence. The predictions, of course, are subject to the uncertainties involved in any projection of population and industrial growths. The recommended pollution abatement schedule necessary to meet these objectives will be presented in the next and final section of the report.

This concludes our presentation of data on the Middle and Lower South Platte River Basin.

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FURTHER STATEMENT OF MARTIN A. BAUER,
DIRECTOR, SOUTH PLATTE RIVER BASIN
PROJECT, REGION VIII, WATER POLLUTION
CONTROL ADMINISTRATION, UNITED STATES
PUBLIC HEALTH SERVICE, DENVER, COLORADO

MR. BAUER: Thank you, Mr. Struzeski.

Mr. Chairman, recommendations for pollution
abatement and remedial time schedules will now be given for
the following areas of study:

- Section I - The Denver Metropolitan Area;
- Section II - Feedlot Operation;
- Section III - Sugar Beet Processing Wastes;
- Section IV - Necessary Flow Augmentation.

I. Denver Metropolitan Area

To insure that the allowable water quality
objectives are not exceeded and effective reduction in
present levels of pollution are obtained, it will be neces-
sary to subject all wastes discharged to Basin streams in
the Denver Metropolitan Area to a minimum of secondary
treatment and provide a higher degree of operating efficiency
in the waste treatment processes. Adequate treatment is

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defined as that which will:

1. Remove at least 90 percent of the BOD and total suspended solids (TSS) and all of the settleable solids.
2. Provide disinfection facilities equivalent to that which will insure a chlorine residual of not less than 1.0 milligram per liter in the plant effluent after a detention period of at least 20 minutes.
3. Remove essentially all toxic materials.
4. Permit no discharge of phenol-like substances in concentrations greater than 25 parts per billion.
5. Permit no visible floating oil or grease in the streams.

A. Specific Recommendations for Municipal Treatment

1. The following plants shall divert all sewage to the Metropolitan Denver Sewage Disposal District No. 1 on or before January 1, 1967:
 - a. City of Arvada
 - b. Baker Sanitation District
 - c. Clear Creek Valley Sanitation District
 - d. City of Denver (Northside)
 - e. City of Denver (Eastside)

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- f. Federal Correctional Institution
- g. Fruitdale Sanitation District
- h. North Washington Sanitation District
- i. N. W. Lakewood Sanitation District
- j. City of Thornton
- k. City of Westminster
- l. City of Wheatridge

2. The following plants shall continue to provide adequate treatment for the removal of BOD, settleable solids and bacteria and, in addition, provide for 90 percent removal of total suspended solids of all sewage discharged to the Basin streams on or before January 1, 1967:

- a. City of Aurora (Sand)
- b. City of Brighton
- c. Fitzsimons Army Hospital
- d. South Adams Sanitation District

3. The following plants shall provide adequate treatment, including disinfection of all sewage discharged to Basin streams. Plans shall be submitted to the State Water Pollution Control Agency on or before January 1, 1967, and additional facilities shall be in operation before January 1, 1968:

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- a. City of Aurora (Westerly
- b. City of Evergreen
- c. City of Littleton
- d. South Lakewood Sanitation District

4. The following plants shall provide adequate treatment, including disinfection, of all sewage discharged to Basin streams, on or before January 1, 1967:
 - a. Buckley Air Station
 - b. City of Englewood
5. The City of Golden (the Adolph Coors Company) shall continue to provide adequate treatment for removal of BOD, settleable solids and total suspended solids, and in addition provide for adequate disinfection of all sewage discharged to Basin streams on or before January 1, 1967.
6. The Metro District plant (presently under construction and to be in operation prior to January 1, 1967) shall provide at least 92 percent removal of BOD and total suspended solids and remove all of the settleable solids in addition to other criteria for adequate treatment on or before January 1, 1967.

Industrial Treatment

1. The following industries shall divert present waste discharges from the South Platte River to the sanitary sewer on or before January 1, 1967:
 - a. Armour Company
 - b. Capitol Rendering Company
 - c. Chicago, Burlington & Quincy Railroad
 - d. Colorado and Southern Railroad
 - e. Denver & Rio Grande Railroad
 - f. Gates Rubber Company
 - g. Kurer Empson Canning Company (Brighton)
 - h. Litvak Packing Company
 - i. United Fryer Stillman
 - j. Samsonite Corporation
2. The Colorado School of Mines Research Foundation shall provide sufficient capacity for the retention pond to prevent overflow to Clear Creek on or before January 1, 1967.
3. The Coors Porcelain Company shall divert floor drain waste discharges from Clear Creek to the sanitary sewer on or before January 1, 1967.
4. The following industries shall provide adequate treatment to further reduce concentrations of phenol to Basin streams on or before June 1,

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1967:

- a. Continental Oil Company
- b. Empire Oil Company
- c. Tenneco Oil Company

In addition, the Continental Oil Company shall provide adequate treatment to remove chromium from their final waste discharges on or before June 1, 1967.

- 5. The Denver Union Stockyards shall alter present livestock drinking water overflow and pen drains to prevent discharge of livestock excreta and feed to the South Platte River on or before January 1, 1967.
- 6. The Gates Cyclo Company shall provide adequate treatment including disinfection prior to discharge to the South Platte River or any Basin waterway. Plans shall be submitted to the State Water Pollution Control Agency on or before January 1, 1967. Treatment facilities shall be in operation before January 1, 1968.
- 7. The Public Service Company of Colorado shall provide adequate treatment to obtain further reduction of total suspended solids from the fly ash lagoon at the Zuni plant and in addition divert the

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overflow and backwash discharge from the softening process to the sanitary sewer on or before January 1, 1967.

8. The Stapleton Airfield shall divert present industrial waste discharges from Sand Creek to the sanitary sewer on or before January 1, 1967.

B. General Recommendations

1. All industrial and commercial establishments in the Denver Metropolitan Area presently discharging raw or inadequately treated wastes to Basin streams via storm sewers and miscellaneous outfalls and not specifically named in part "A" of the Recommendations, be investigated by municipal, county or State authorities and the wastes diverted to the sanitary sewers prior to January 1, 1967.
2. In those cases where concentrations of certain wastes, such as paunch contents, grease, oil and toxic materials are not acceptable to municipal sewage treatment plants, satisfactory in-plant treatment facilities shall be provided. Facilities for such in-plant treatment shall be in operation by January 1, 1967.
3. In those cases where use of the sanitary sewer

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system is considered to be unreasonable by the State Water Pollution Control Agency, adequate secondary treatment of wastes must be provided. Plans shall be submitted to the State Water Pollution Control Agency on or before January 1, 1967, and the facilities placed in operation on or before January 1, 1968.

C. Other Recommendations

1. All waste settling ponds shall be provided with a seal of an impermeable material to prevent pollution of the valley-fill aquifer.
2. A ground-water monitoring program be established and carried out by the State and/or local health authorities in areas affected by excessive nitrate and ABS.
3. An appropriate State Agency be empowered to approve or disapprove sources of supply and treatment facilities for municipal water systems.
4. All sources of public water supply be subject to effective disinfection by chlorination or other approved methods with provision for adequate detention and duplicate feeding devices.
5. An appropriate State Agency be empowered to approve

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or disapprove plans for municipal and industrial treatment facilities prior to construction.

6. The staffs of the appropriate State Agencies be increased to provide the necessary supervision and technical advice for carrying out an effective water supply and pollution control program.
7. A program of surveillance of the Basin waters must be undertaken by the appropriate State Agency to obtain the data required for constant evaluation and to insure the highest possible benefits consistent with future legitimate and beneficial water uses.

Section II. Feedlot Operations

Mr. Chairman, do you wish that I read the recommendations on the feedlot operations?

MR. STEIN: Yes.

MR. BAUER: Section II. Feedlot Operations.

To achieve an ultimate solution, feedlot operations should be relocated away from urban and suburban populations and streams; however, as an interim measure, it is recommended that:

- A. The four feedlots which pump or pipe waste drainage to the surface streams:

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1. The Monfort Feedlot in Greeley
2. The Farr Farms Feedlot in Greeley
3. The Weisbart Feedlot in Brush
4. The Mancini Feedlot in Brighton

shall initiate plans to design and construct adequate treatment facilities such as the use of lined lagoons, or treat these wastes by equivalent means to prevent the pollution of both surface and ground-water resources.

B. The seven feedlots which have overland drainage to surface streams:

1. The Western Beef Feedlot in Denver
2. The Farr Farms Feedlot in Greeley
3. The Mancini Feedlot in Brighton
4. The National Food Company Feedlot in Brighton
5. The Mountain View Angus Ranch Feedlot in Platteville
6. The Ludlow Cattle Company Feedlot in Longmont
7. The Tittle Feedlot north of Greeley

shall initiate plans to design and construct berms or suitable drainage facilities to divert the surface runoff to lined lagoons or treat these wastes by equivalent means to protect against the pollution of both surface and ground waters.

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- C. Waste abatement requirements for these nine feedlots are to be developed before January 1, 1967, by the State Water Pollution Control Agency. Overall planning should be coordinated with the South Platte River Basin Project. Necessary feedlot waste handling and treatment facilities shall be constructed before January 1, 1968.
- D. All feedlots in the South Platte River Basin shall initiate a program for frequent removal of manure and other waste material in the feedlots. Efforts shall be made by the industry to reduce odor to a minimum. The feedlot program shall be regulated by the State Water Pollution Control Agency.

Section III. Sugar Beet Processing Mills

The following pollution abatement schedule applies to the Middle and Lower Basin areas. This includes the mainstem South Platte River from Brighton to the Colorado-Nebraska State line, St. Vrain Creek from Longmont to the stream mouth, the Big Thompson River from Loveland to the stream mouth, the Little Thompson River from Johnstown to its mouth, and the Cache la Poudre River from Windsor to its mouth.

It is recommended that:

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- A. The sugar beet industry provide treatment of wastes so that the total 5-day BOD load discharged in any given day in the total effluents entering Basin streams or waterways shall not exceed the following values for the respective plants. Residual wastes may be discharged over an extended period of the year if necessary.

Brighton	--	1100 pounds 5-day BOD per day
Longmont	--	1450 pounds 5-day BOD per day
Loveland	--	1750 pounds 5-day BOD per day
Johnstown	--	800 pounds 5-day BOD per day
Windsor	--	1100 pounds 5-day BOD per day
Eaton	--	1000 pounds 5-day BOD per day
Greeley	--	1100 pounds 5-day BOD per day
Fort Morgan	--	3000 pounds 5-day BOD per day
Sterling	--	2200 pounds 5-day BOD per day
Ovid	--	2800 pounds 5-day BOD per day

- B. There be no settleable solids contained in the total effluents, and that suspended solids loads in the effluents not exceed the numerical levels prescribed above for 5-day BOD.
- C. Disinfection be provided for each waste discharge so that the receiving stream or waterway directly below each mill shall not show an increase of more

than 5,000 total coliform bacteria per 100 ml, and 1,000 fecal coliform per 100 ml, over the corresponding densities upstream of the mill discharge.

- D. Dissolved oxygen in the treated waste effluents not be less than 2 milligrams per liter at any time to insure minimum dissolved concentrations of 4.0 mg/l in the receiving streams or waterways.
- E. There be absence of grease, oil, floating solids, slime or sludge banks in the receiving streams, or waterways, as a result of waste discharges from the sugar beet mill.
- F. Waste treatment and control measures and other procedures shall not cause pollution of the underlying valley-fill aquifers.
- G. There be no disagreeable odors or other nuisance in the areas outside of, and immediately adjacent to, the plant sites.
- H. Each sugar beet mill shall conduct continuous monitoring of the quality of the final waste effluents and of each receiving stream above and below the points of waste discharge to these streams. Adequate records shall be maintained by each plant on water quality and shall be reported regularly to the State Water Pollution Control Agency.

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- I. The waste abatement measures given above for the sugar beet industry in the South Platte River Basin shall be completed by September 30, 1968, to provide full capacity for total plant wastes in the 1968-69 campaign and all subsequent campaigns.
- J. Final approval of design plans on all waste treatment and control measures, inspection during and following construction of facilities, and final joint evaluation (together with the industry) of waste treatment and control performance shall be provided by the State Water Pollution Control Agency.

Section IV. Flow Augmentation for Water Quality Control

Since available streamflows under present water use patterns are not sufficient to guarantee adequate water quality for all future uses, even with the recommended waste abatement program in effect, flow augmentation is necessary. It is estimated that flow augmentation in the order of 10,000 to 18,000 acre-feet per year is needed on the main-stem of the South Platte River, and 6,000 to 11,000 acre-feet per year each on St. Vrain Creek, the Big Thompson River, and the Cache la Poudre River.

The pollution abatement schedule assumes that quantities of surface water, including reservoir flows,

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presently used by sugar beet mills in processing, will not change significantly in the future.

It is recommended that:

- A. Minimum streamflows of 25 cfs be maintained on the mainstem South Platte River throughout the entire year and at all locations, from upstream of Littleton down to the Colorado-Nebraska State line.
- B. Minimum streamflows of 15 cfs be maintained on St. Vrain Creek from above Longmont downstream, on the Big Thompson River from above Loveland downstream, and on the Cache la Poudre River from above Windsor downstream, throughout the entire year and at all locations within the designated areas.

Mr. Chairman, this concludes the Project report.

MR. STEIN: Thank you for a very comprehensive report, Mr. Bauer.

Are there any comments or questions from the conferees?

(No response.)

MR. STEIN: Mr. Bauer, what would you estimate would be the total amount in acre-feet of water needed to restore quality control on the South Platte River for flow augmentation under your plan?

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MR. BAUER: Well, Mr. Chairman, if you mean the total amount of acre-feet per year of water that would be needed on the South Platte River?

MR. STEIN: Yes.

MR. BAUER: We estimate between 10 and 18,000 acre-feet per year.

MR. STEIN: No, I didn't say the mainstem. The whole system.

MR. BAUER: The whole Basin?

MR. STEIN: The whole Basin. Because you split these up, I wonder if you added the whole figure?

MR. BAUER: If we added the whole figure together, we would have about 52,000 acre-feet per year, if you took the high figure.

MR. STEIN: I take it if this water were put in the stream, it would have to remain in the stream?

MR. BAUER: That is correct.

MR. STEIN: It wouldn't do much good if someone just piped it out a little bit below for irrigation or other purposes?

MR. BAUER: That is correct, Mr. Chairman. It would have to remain in the stream at all times, at all points, throughout the system.

MR. STEIN: Thank you.

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Now, there was another point, and I think this possibly needed clarification.

When you are talking in terms of phenol reduction, you say:

"The following industries shall produce adequate treatment to further reduce concentrations of phenol to Basin streams on or before June 1, 1967."

Let's split the phenols like we did that infinitive. What are the concentrations you mean?

On Page 59 you have 25 parts per billion. Is that what you are talking about?

MR. BAUER: That is correct, sir. We are talking about the adequate treatment as we have defined in the first part of the section for recommendations, 25 parts per billion.

MR. STEIN: All right. That clarifies it for me, in any event.

Are there any further comments or questions?

DR. CLEERE: Mr. Chairman, may I ask a question, please?

I think it would be helpful if we received more technical information with respect to the paunch manure problem, particularly as related to the discharge

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into the Denver sewerage system.

MR. BAUER: Dr. Cleere, do you mean you want us to give you more technical information here today?

DR. CLEERE: If you would just elaborate on the recommendations with respect to disposal on paunch manure?

MR. BAUER: We would be glad to do that, sir, and, Mr. Chairman, I would like to call on Mr. Fitzpatrick to answer this question.

MR. STEIN: Go right ahead.

MR. FITZPATRICK: You are speaking, Dr. Cleere, of the methods of correcting this problem.

DR. CLEERE: Yes.

MR. FITZPATRICK: I think that the Project is recommending that in-plant treatment be utilized to remove the paunch contents from each individual slaughterhouse prior to discharge.

DR. CLEERE: In other words, you are recommending that no paunch manure reach the Denver municipal treatment plant, the Denver sewage disposal plant, the District plant?

MR. FITZPATRICK: Yes, sir. That is correct. We estimate that a great deal of paunch manure is now presently being removed in this fashion. It is being taken

out in the individual slaughterhouses, but, unfortunately, it is not being completely taken out, and I feel we are recommending that it be taken out entirely by in-plant treatment in the slaughterhouses.

DR. CLEERE: Thank you.

MR. KLASHMAN: Mr. Bauer, on your recommendation on suspended solids removal, you referred to the BOD figures.

Do you want to clarify that? Do you mean that the pounds of BOD removal were exactly the same as the pounds of suspended solids removal?

MR. BAUER: That is correct. When we talk in percentages of removal, we call adequate treatment 90 percent removal of BOD. We talk in the same terms as far as total suspended solids, 90 percent.

MR. STEIN: You are now talking in terms of percentages. I didn't quite understand that either, Mr. Bauer.

Let's look at Page 67, Paragraph B.

MR. BAUER: In B on Page 67?

MR. STEIN: Yes. You say:

"There be no settleable solids contained in the total effluents, and that suspended solids loads in these effluents not exceed the numerical levels prescribed above for 5-day BOD."

M. A. Bauer

Now, what do you mean by that? Do you mean the suspended solids, for example, for the Ovid plant not be more than 2,800 pounds per day?

MR. BAUER: That is correct, not to exceed the levels that we have prescribed for each and every mill for the five-day BOD removal.

MR. KLASHMAN: Mr. Bauer, that would achieve what, somewhere between 90 and 95 or 98 percent?

MR. BAUER: Between 80 and 95 percent treatment.

MR. KLASHMAN: Of suspended solids removal?

MR. BAUER: That is correct.

MR. KLASHMAN: Thank you, Mr. Bauer.

MR. STEIN: Are there any further comments or questions?

(No response.)

MR. STEIN: If not, we can proceed with the rest of the Federal presentation.

Mr. Klashman?

MR. KLASHMAN: Before proceeding, I would like to introduce two other people, Dr. William Ingram, who is one of our senior scientists in the field of aquatic biology.

Dr. Ingram, we are very happy you are here with us.

And Mr. Fred Harmston from our Communicable Disease Center in Greeley, Colorado. Are you still here, Mr. Harmston?

(No response.)

MR. KLASHMAN: He was here.

MR. STEIN: As long as we are doing that, I would like to introduce a distinguished guest and, again, a visitor from Wyoming, a former member of the President's Water Pollution Advisory Control Board, and a long-time friend, Mr. Long of Buffalo, Wyoming.

Will you stand up, Mr. Long?

MR. LONG: Thank you, Murray.

MR. STEIN: Glad to see you back.

MR. KLASHMAN: We will now proceed with the other Federal agencies.

Mr. H. P. Dugan, who is the Regional Director for Region 7 of the Bureau of Reclamation.

I believe you have a statement.

STATEMENT OF H. P. DUGAN, REGIONAL
DIRECTOR, REGION 7, BUREAU OF RECLAMA-
TION, DENVER, COLORADO

MR. DUGAN: Thank you.

Mr. Chairman, ladies and gentlemen:

I am very happy to have this opportunity to discuss with you the progress that Reclamation's Region 7 has made in water resource planning in the South Platte River Basin since the First Session of this Conference in October 1963.

As you know, the Bureau of Reclamation is vitally interested in the development of water resources in the South Platte River Basin. Certainly, water quality control is a very important aspect to be considered in planning for and making use of this Basin's limited water resources now and in the future.

We are currently developing plans for three proposed units of the Missouri River Basin Project South Platte River Basin. These are the Narrows Unit, the Upper South Platte Unit, and the St. Vrain Unit. While each of these proposed projects has potential for water quality control, I am best able to discuss with you the water

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quality effects of the Narrows Unit because our planning studies for Narrows are considerably more advanced than those for the other two projects.

The plans we have developed for the Narrows Unit proposes the construction of an earth-fill dam on the South Platte about seven miles upstream from Fort Morgan, Colorado. The primary purpose of the resulting reservoir would be the development of supplemental water supplies for the existing irrigation systems located along the South Platte River. Other functions of Narrows include flood and sediment control, water quality improvement, and enhancement of fish, wildlife and recreation.

Narrows Reservoir could improve the water quality aspects in the Lower South Platte River in two ways. First, releases of project water to meet the demands of downstream irrigators would provide higher flows in the South Platte River during the irrigation season. Second, the project water in Narrows will be of relatively good quality because water available for storage will basically come from snow melt and flood runoff. Irrigation return flows from the use of this high quality project water will be of relatively better quality than much of the present return flows. Therefore, during the low flow months of

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July, August, September and October, return flows from project water would augment the present base flow, resulting in higher base flows of better quality. For example, during these four months in the critical year 1954, the total historic flow of the South Platte at Julesburg was 1,400 acre-feet per month, an average of about 23 cubic feet per second. Under "with project" conditions, the flow during this same period would be about 4,500 acre-feet per month, or about 75 cubic feet per second. In summary, Narrows will result in greater consumptive use of water in the South Platte River, which will, in turn, cause an increase in the concentration of total dissolved solids in the average flow. This deterioration in average flow, which cannot be avoided if we are to use this water resource in Colorado, should be more than offset by an improvement in the quality and magnitude of the flow during the critical, low flow periods. We feel confident that Narrows will make a significant contribution toward flow augmentation for improvement of water quality.

Although our planning studies for the Upper South Platte and the St. Vrain Units are not as well advanced as those for Narrows Unit, we feel that these proposed projects could also contribute to the maintenance of the desired minimum flows in the upper portions of the

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South Platte River Basin. The hydrologic studies for Two Forks Reservoir are taking this into consideration and, if possible, it will be integrated into the plan of development. As we proceed with our analyses of these and other projects, we will continue to cooperate with the Federal Water Pollution Control Administration and the Colorado State agencies in attempting to develop plans which will best satisfy the many, and often competing, needs for water in the South Platte River Basin.

Thank you, Mr. Chairman.

MR. STEIN: Thank you, Mr. Dugan, for a very comprehensive and excellent statement.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much.

You know, Mr. Dugan, I don't know if the people realize we are dealing with two agencies now, but by about May 10th we will both be in the same Department. I don't know whether you will notice the difference. We will be under the same rule.

MR. DUGAN: Well, Mr. Stein, we certainly will welcome you to a happy family. It will be a pleasure to have you with us.

MR. STEIN: We are glad to come. Thank you.

Mr. Klashman?

MR. KLASHMAN: I would now like to call on
Mr. Robert Foster from the Fitzsimons General Hospital.

Are you here, Mr. Foster?

MR. FOSTER: Yes.

MR. KLASHMAN: Do you have a statement you want
to read?

MR. FOSTER: Yes.

MR. KLASHMAN: Will you come up, please?

Mr. Foster, I understand your statement is being
given for Colonel Matthews, who is the Post Engineer. Is
that right?

MR. FOSTER: That's right.

MR. KLASHMAN: Thank you.

STATEMENT OF ROBERT FOSTER, SUPER-
INTENDENT, SEWAGE TREATMENT PLANT,
FITZSIMONS GENERAL HOSPITAL, UNITED
STATES ARMY, DENVER, COLORADO

MR. FOSTER: Mr. Chairman, ladies and gentlemen:

I represent a plant that was established in
about 1919 and was completely rebuilt in 1942 to the highest
standards available at that time.

R. Foster

We have been asked to state that we will continue the treatment as we are presently, and with particular reference to suspended solids. We show that we are accomplishing this. From January 1960 to April 1966, suspended solids reduction has averaged 89 percent.

June to December, the average monthly reduction has exceeded 90 percent.

Effluent from our reservoir to Toll Gate Creek is under 10 parts per million BOD.

Thank you.

MR. KLASHMAN: Thank you very much, Mr. Foster.

Are there any other Federal agencies that are present that wish to make a statement?

(No response.)

MR. KLASHMAN: If not, that concludes the presentation by the Federal agencies, Mr. Chairman.

MR. STEIN: Thank you, Mr. Klashman.

At this point we will again stand recessed for ten minutes. During this recess, if you wish, you can obtain copies of the report and the attachments for your own use.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

R. L. Cleere

Dr. Cleere?

STATEMENT OF DR. ROY L. CLEERE, CONFEREE
AND DIRECTOR, COLORADO STATEMENT DEPART-
MENT OF PUBLIC HEALTH

DR. CLEERE: Mr. Chairman, members of the
conference:

I have a rather brief statement to submit.

The State Department of Public Health has long engaged in water pollution prevention and abatement work. In the early history of State government, the Board of Health concerned itself with stream pollution control before the existence of specific State statutes governing pollution. Beginning with 1950, the Department exercised control through the use of regulations applied to domestic and industrial sewage. In 1955, additional legislation provided a procedure for dealing with pollution violators and a coliform density standard. In 1957, the Sabin State and local Health Department laws were enacted. The local Health Departments are of great assistance in controlling pollution. In 1959, a standard for domestic sewage (defined as containing human excrement) was established by the Legislature. The 1959 amendment established effluent standards which

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require that, in addition to coliform density, sewage discharges shall not contain more than 0.5 milliliters per liter settleable solids, 75 parts per million suspended solids, 50 parts per million settleable solids BOD. The 1959 statutory standards make secondary sewage treatment of domestic sewage a necessity for compliance. In 1966, the General Assembly enacted a comprehensive water pollution law known as the Colorado Water Pollution Control Act of 1966.

Progress has been made in Colorado toward pollution prevention and abatement. A tabulation of municipal waste disposal for the State of Colorado for 1953 and 1956 is contained in four tables which I am submitting for the record.

(The tables referred to are as follows:)

<u>Type of Facility</u>	<u>For Year 1953</u>		<u>Population Percentage</u>
	<u>Number Facilities</u> <u>(Plants)</u>	<u>Population Served</u>	
Connected to sewers	--	1,905,755	100%
Discharging untreated	44	81,449	8.1%
Primary treated	56	847,226	84.2%
Secondary treated	<u>37</u> 137	77,080	7.7%

<u>Type of Facility</u>	<u>For Year 1966 (As of January 31st)</u>		<u>Population Percentage</u>
	<u>Number Facilities</u> <u>(Plants)</u>	<u>Population Served</u>	
Connected to sewers	--	1,722,725	100%
Discharging untreated	22	12,330	0.7%
Primary treated	33	662,380	38.3%
Secondary treated	<u>180</u> 235	1,048,015*	61.0%*

*As of October 1966, the Secondary treatment plant now being built by the Metropolitan Denver Sewage Disposal District No. 1 is scheduled for initial operation; it will shift most of the population now receiving primary treatment to that receiving secondary treatment.

<u>Type of Facility</u>	<u>For Year 1966 (As of October - Start of Metro)</u>		<u>Population Percentage</u>
	<u>Number Facilities</u> <u>(Plants)</u>	<u>Population Served</u>	
Connected to sewers	--	1,722,725	
Discharging untreated	22	12,330	0.7%
Primary treated	33	32,580	1.9%
Secondary treated	<u>180</u> 235	1,677,815	97.4%

A summary of municipal waste disposal for the United States for 1962 (latest available) indicates:

<u>Type of Facility</u>	<u>Number Facilities</u>	<u>Population Served</u>	<u>Population Percentage</u>
Connected to sewers	11,131	118,371,919	100%
Discharging untreated	2,139	14,686,941	12.4%
Primary treated	2,757	42,493,626	35.8%
Secondary treated	6,584	61,191,352	51.8%

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DR. CLEERE: In summary, we find that in 1953, 84.2 percent of our sewered population had primary treatment, and only 7.7 percent had secondary treatment. In 1966, we have 235 sewage treatment plants serving 1.7 million people. Upon completion of the Metropolitan Denver Sewage Disposal District Plant in October of 1966, I am pleased to report that 97.5 percent of our sewered population will have secondary sewage treatment.

A summary of municipal waste disposal by population percentage for the United States shows that Colorado sewage treatment facilities provide a higher type of treatment to a greater percentage of population than is provided nationally. Our record before the year ends will be 97.5 percent; the national average for secondary treatment is 51.8 percent. Discussions and statements in answer to findings presented by the Federal Water Pollution Control Administration will show that in most instances corrective action has already been initiated, or even completed. The record also shows that the State Health Department has constantly taken action to obtain prevention and abatement of pollution. While the deficiencies presented by the Federal Water Pollution Control Administration do focus attention on specific and serious instances, the foregoing statistics indicate that a great deal of good work has

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been accomplished in water pollution control abatement; further, that work is continuing in the direction designed to bring full protection to the water resource.

Colorado municipalities and industry have expended huge sums of money for the treatment of sewage. Beginning with the year 1956 to the present, the value of construction for sewage treatment facilities in Colorado is estimated to be over \$60,000,000. During the last decade, industry has expended over \$10,000,000. The value of Federal construction grant funds awarded in Colorado has been over \$10,000,000. Considering that even with the grant funds the local community must pay 70 percent or more of the cost is an indication that the people are sincere in their efforts to prevent and abate water pollution.

I would like to recognize and commend citizens of many communities in the South Platte Basin who have recently constructed or have under construction new sewage treatment facilities. They are Fort Lupton, Greeley, Platteville, Evans, Johnstown, Berthod, Loveland, Estes Park, Sterling, and Brush.

I would also commend those citizens and communities who have plans for construction of adequate sewage treatment plants in the very near future. These are

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Boulder, LaSalle, Fort Collins, Louisville and Lafayette.

Unfortunately, there are a few communities that must be made aware of the necessity for sewage treatment. These towns are Milliken, Ovid, Eaton and Wellington.

Industries have been implicated in today's report as being the largest polluters after completion of the Metro Denver Sewage Plant; however, several industries have taken steps to curb pollution of the South Platte. They are: Coors Brewery, Monfort Packing Company of Greeley, Packaging Corporation of America, Fort Morgan Packing Company, Sigman's Packing Company of Brush, and New Sterling Packing Company.

The State of Colorado is advanced in its water pollution prevention and abatement efforts. Continued population increase, plus more industry and irrigated agriculture, add to the water pollution problem simply because of the additional contamination produced.

Quite significant is the population impact now occurring in the high altitude region of the State. This is a region never before subject to water pollution. That is to say, outdoor recreation (in numbers of people) in the high mountains and forested areas is now sufficiently large to be a matter of concern.

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Outdoor recreation practically results in moving substantial communities into the outdoor recreation areas for most of the weekends each year. These influxes of people tax, far beyond their capacity, the facilities presently available in small mountain communities. Water pollution caused by seepage waters from irrigated crop lands, the complete diversion of stream flow at a few points, and the pollutants of large industries indicate the magnitude of the problem remaining.

The South Platte River has often been called the "South Pollute." We may also accurately refer to the South Platte River as the "colon of Metro Denver." The South Platte River, in its journey through 16 counties, travels through the greatest population concentration in the State. It also runs through rural and agricultural lands. It serves as a conveyor of waste products for industries, food processors, and livestock enterprises -- all of which are not in metropolitan areas.

I do wish to make brief reference to the change in attitude of the Denver municipal officials and the citizens of Denver with respect to pollution of the South Platte River that has occurred during the past eight years.

For many years, it was a fact of life that the attitude with respect to the pollution of the South Platte

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River was one of indifference, that the South Platte River was dedicated to carrying Denver sewage and the people downstream might as well get used to it.

Fortunately, there has been a complete reversal and change in attitude, and at the present time there is excellent cooperation on the part of the responsible officials and the citizenry in the Metropolitan Area of Denver.

Within six months, the Metro Denver Sewage Disposal complex will be in operation and rectify the worst pollution of the South Platte, but when this is achieved, the existing industrial sources, namely, the Great Western Sugar Company, will stand out more sharply, and there will be as much demand for control of these wastes as that directed at the Denver area. I do wish to give credit to Great Western Sugar Company for their cooperative attitude in the past and for the steps they have taken to reduce the wastes from the plants, although these measures have proved to be inadequate. It will be another achievement when industries in the South Platte Basin bring the strength of their waste waters into conformity with the recommendation presented by this conference.

We look forward to a sound plan for classi-

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fication of our streams for recreational, industrial, agricultural or domestic water usages. The report presented earlier does suggest classification standards for various portions of the South Platte. I believe the newly appointed Water Pollution Control Commission will give these standards consideration, along with others which have been submitted.

In the exercise of administration, the fitting of Federal and State laws together into a workable manner presents an additional problem of much complexity. It clearly indicates the need for more highly trained personnel. The cost of administering the water pollution control program is considerable. The cost of the South Platte River Survey will approach, possibly exceed, one million dollars. This is slightly more than one-half the cost (\$1,955,000) of the new Fort Collins sewage treatment plant.

The State Health Department during fiscal year 1964-65 spent approximately \$115,000 on the administration of water pollution control activities. This expenditure pays for work on review of plans and specifications, processing applications for Federal construction grants, some operator training, considerable time to liaison, preparation of reports, work with Federal Water Pollution

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Control Administration on both Colorado River and South Platte River Basin studies, and much time to activities involving prevention and abatement of water pollution through actions to secure compliance with State law.

Pollution is considered a result of being uninformed. Our abatement programs will proceed faster when the public is knowledgeable about its problem and the solution. We must overcome the attitude of some citizens and community officials that construction of sewage treatment facilities is to benefit someone else who lives downstream. Many cities are proud of their parks and schools and civic culture, yet some towns and industries still persist in dumping raw sewage and other wastes into our streams.

We have appreciated the interest in clean water of numerous civic groups functioning as the Colorado Clean Streams Committee. This group has assisted in making clean water a popular issue in Colorado. Boulder County has formed an active chapter. Jefferson County is in the midst of forming a chapter and will have a Conference on Clean Water for residents of that county on Thursday, April 28 -- that is tomorrow -- at the Jefferson County Fairgrounds. Larimer and Adams counties are also working toward county committees.

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Overall, there remains the very real problem of communities, industry and other polluters in raising sufficient money to provide the necessary sewage treatment facilities for both domestic and industrial waste waters -- facilities that must be built because it is only treatment facilities, not laws, that prevent and abate water pollution.

Thank you.

MR. STEIN: Thank you, Dr. Cleere.

Are there any comments or questions?

(No response.)

MR. STEIN: I would like to say for myself, and, I am sure, the Federal staff -- I know I have been working with Dr. Cleere on these and other environmental health matters at least since 1948, and I will say in Colorado we have always maintained lines of communication and have kept up a dialog between State and Federal officials.

I know of no case over these years -- and this is a long time -- where after conversation we did not have agreement and unanimity of opinion. I think this is a pretty good record.

I know we are going to be faced with this kind of continuing problem with the new Colorado Board, and I hope we will be able to maintain the same record that we

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have maintained with Dr. Cleere.

I would like to say this record is not one necessarily only for the Federal Government to be proud of. In no small measure it was due to Dr. Cleere's patience, wisdom, insight and flexibility.

Dr. Cleere, it has been wonderful, and I hope we can continue this way in this program.

DR. CLEERE: Thank you very much. I wish you would submit a transcript, if you will, to the Governor and to the Board of Health.

(Laughter.)

MR. STEIN: To make it clear, if Dr. Cleere didn't, you talk about the funds of \$115,000. Does that include the Federal grant?

DR. CLEERE: Does that include the Federal grant, Bill, the \$115,000?

A VOICE: Yes, it does.

MR. STEIN: We talk about States' rights, but we also have States' responsibilities in water pollution control.

You know, in the Federal Water Pollution Control Administration, we have 1,500 employees. We were able to put 25 people and a quarter of a million dollars in the South Platte.

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I would suggest that the time to help in the State agency and Dr. Cleere in the State Health Department is when he goes up for a budget or for more people, because this is when the crunch is on, and you can't expect the State really to do a job unless they are equipped to do the job and have the forces.

Considering the amount of forces that the State has and the amount of forces in the Federal Government, we have this overbalance sometimes, it seems, with Federal forces and abilities and facilities able to do a program. If you people are really sincere about States' rights, it seems to me that the first place to deal with these States' rights is to see that Dr. Cleere is adequately staffed to do a job. Then you can exercise the States' rights.

Dr. Cleere, do you have any invitees to call on?

DR. CLEERE: Yes, Mr. Chairman. As a matter of fact, I have a list of nineteen that have expressed a wish to make statements during this conference, and I believe ten others who may wish to make statements.

So, if it meets with your approval and is in order, I will proceed to call on these representatives of various industries to submit statements.

MR. STEIN: Yes. We will proceed until about half past four, or a little thereafter, if you wish. With

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the list you have, we will probably have to reconvene tomorrow in order to complete this.

Dr. Cleere?

DR. CLEERE: May I ask one question with respect to protocol?

We have letters from several key officials of industries who could not be present in person, but wish to have their statements entered into the record. Should those statements be read?

MR. STEIN: I think it might be appropriate, if the letters are not too long, to read the statements here so that the Board has these and the people in the audience have the benefit of them. I think this helps if we are going to come to any conclusions.

I think all the people out in the audience should know all the information and have all the information available to them that is available to the conferees in coming to their conclusions. I think the best way to do that is to read the letters, because we may be some time in duplicating these and getting them out.

DR. CLEERE: Mr. William N. Gahr, Director of Engineering, Sanitation Division of the State Health Department. If you will come forward, please? I believe you have those letters, either you or Mr. Frank Rozich.

Will you please stand, Frank Rozich?

Mr. Rozich is the Chief of the Water Pollution Control Section for the State Health Department.

When we reach those names, I will call on one of you to read the letters. Thank you.

Mr. Harry A. Feder of the Litvak Meat Company.

Then I will follow by calling on Dr. Samuel Johnson, Director of Preventive Medicine in the Public Health Division, City Health Officer of the City and County of Denver, to follow Mr. Feder.

STATEMENT OF HARRY A. FEDER, ESQ., ON
BEHALF OF THE LITVAK MEAT COMPANY, INC.,
5900 YORK STREET, DENVER, COLORADO

MR. FEDER: Mr. Chairman and members of the assembly:

My name is Harry A. Feder and I am a member of the firm Feder, Morse & Feder, representing the Litvak Meat Company.

During the past years, this company has tried in every manner to cooperate with the State Health Department in the matter of the disposal of waste materials from their meat packing plant. In the last two years, they have

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completely remodeled and installed what we call an in-plant operation.

Now, this is an operation that is located on the packinghouse premises, which serves both the packinghouse and the rendering plant. All the sewage wastes from the packinghouse and the rendering plant are directed to a pit that is 30 feet long, 6 feet wide and 10 feet deep. It is located at the rear of the buildings.

A mechanical skimmer collects the grease into a pressure tank and then is blown to the rendering cooker for processing as an inedible product.

The paunch manure flows to a sump, where the contents of the pit are pumped over a stainless steel simplicity vibrating screen of No. 20 mesh. The liquid wastes from this process are discharged to the North Washington Street Water and Sanitation District, and the solids are conveyed to a storage hopper, from which they are taken by a fertilizer concern for disposal.

This firm has employed the Industrial Laboratories of Denver to perform regular and repeated analysis of the facilities to insure that a maximum recovery is made of all unnecessary product.

We have now connected our waste runoff water

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to the sewer lines of the North Washington Street Water and Sanitation District, and there is not one drop of any sewage or waste or water or material of any kind that is being deposited in the South Platte River.

We received a request from Mr. Gahr recently, indicating to us that recommendations had been made by either the State Board of Health or the Federal Pollution Commission, to the effect that all of our industrial waste discharges must be diverted into a sanitary sewer by January 1st, 1967. We are happy to report that this has been accomplished as of May 15, 1966.

Thank you.

MR. STEIN: Thank you, Mr. Feder.

Are there any comments or questions?

Mr. Klashman?

MR. KLASHMAN: Mr. Feder, could I just get something clarified for the record here?

As far as the paunch manure is concerned, my concern, of course, is that the North Washington Sewage Treatment Plant be capable of handling your wastes. What happens to your paunch manure and grease? How much of it goes to North Washington?

MR. FEDER: All of the paunch manure, Mr. Klashman, is collected and hauled away by a fertilizer

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company. None of it moves into the sewer line of the North Washington Street Water and Sanitation District.

MR. STEIN: How about your grease?

MR. FEDER: The grease is skimmed. We have a mechanical skimmer, which skims the grease into a pressure tank, and then that is blown into a rendering cooker and is processed.

MR. STEIN: I know this may be an awkward question for one lawyer to ask another lawyer, but do you know how much grease after that gets into the sewer?

MR. FEDER: So very little that I am sure that the laboratories that have been making these tests -- I don't have their reports in front of me, but they are at a very minimum.

MR. STEIN: Generally speaking, I think the economics of the packing industry are such that good house-keeping in the capturing of the grease is good business. I don't think it is good business these days to dump the grease into the sewer, even though that does give us a headache.

MR. FEDER: Definitely, the grease is worth dollars to the industry.

MR. STEIN: One more question -- and I don't know whether you can answer this -- do you know how the

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paunch manure gets from the plant to where it is disposed of? Is it trucked away or piped?

MR. FEDER: It is trucked away from a hopper, which collects it finally.

MR. STEIN: And no solid paunch is put into the sewer?

MR. FEDER: None whatever, sir.

MR. STEIN: Thank you.

MR. KLASHMAN: Mr. Feder, we did some work in January or February of 1965 and found that there were considerable amounts of paunch and grease going in. Have you made changes since then that have corrected this?

MR. FEDER: Yes, we have, sir.

At the time that those checks were made, the plant was in the process of doing an extensive remodeling job, and the facilities were, might I say, not working -- they were not working at 100 percent efficiency. At this time all that has been completed, and our facilities are now working at 100 percent efficiency.

MR. KLASHMAN: We are certainly glad to hear that, and when we go back and sample, I am sure we will confirm the results of the laboratories.

MR. FEDER: I am sure you will find that your

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sampling will confirm what we have told you here.

MR. STEIN: This is largely for the record:
Do you know what your ultimate disposition of the paunch
manure is from your plant?

MR. FEDER: All I know is that it is taken away
by a fertilizer concern, and it is used in some sort of a
fertilizing process.

MR. STEIN: I think that is fair enough, because
really, from a pollution standpoint, once you put it in a
truck and truck it away, I think that solves the pollution
problem; but there is always a question of removing paunch
from the plant, and there are various ways to dispose of it.
I assume that using it as a fertilizer is one.

MR. FEDER: That is right, sir.

MR. STEIN: Are there any further comments or
questions?

(No response.)

MR. STEIN: If not, thank you very much, Mr.
Feder.

MR. FEDER: Thank you very much, Mr. Chairman.

DR. CLEERE: Dr. Samuel Johnson, please.

I failed to mention that Dr. Johnson is also
Chairman of the Health Officers Association in Colorado,
in addition to being Health Officer of the City and County

of Denver.

Dr. Johnson

STATEMENT OF SAMUEL JOHNSON, M.D.,
DIRECTOR, DIVISION OF PUBLIC HEALTH
AND PREVENTIVE MEDICINE, DEPARTMENT
OF HEALTH AND HOSPITALS, DENVER,
COLORADO

DR. JOHNSON: Mr. Chairman and ladies and gentlemen:

I am Dr. Samuel Johnson, Director of the Denver Health Department.

The Denver Health Department is the local enforcement agency for the control of water pollution in the South Platte River and other bodies of water within the City and County of Denver. To fulfill this responsibility, the Department, in cooperation with the Department of Public Works, has initiated programs to correct stream pollution in our area.

The first step in water pollution control was taken by citizens of Denver along with other communities in the metropolitan area when they approved the \$32.5 million bond issue to finance the construction of the Metropolitan Sewage Disposal plant. With the completion of this plant

S. Johnson

in late 1966, the problem of adequate sewage treatment for the City of Denver should be solved.

To control industrial water pollution, a program was initiated by the Denver Health Department in early 1965. Immediate steps were taken to survey the South Platte River to determine the location of all possible sources of pollution. Waste water samples were collected at each outlet discharging wastes into the river, and laboratory analysis was performed on these samples to determine the type of pollutants present. This survey was completed in December 1965. We found that 27 industries were contributing the majority of the pollution to the South Platte River through 29 outlets discharging directly to the river, and 16 outlets discharging into the storm sewer system, which ultimately flows into the river. Types of pollutants found were greases and oils, laundry wastes, chemical wastes, car and truck washing wastes, and wastes from the stockyards area.

Significant progress has been made in the abatement of water pollution in Denver. To date, orders have been written to 21 industries to correct their water pollution problem. Two are already making the necessary corrections. Two other industrial firms had solved their problem before orders were issued.

S. Johnson

I might indicate here that one of the industries specifically named in the report you heard earlier, United Fryer Stillman, has already connected to the sanitary sewer system.

It has been found that the water pollution problem can be solved, in most cases, by connecting the industrial wastes which now discharge into the river to the sanitary sewer system. With the completion of the new Metropolitan Sewage Disposal Plant, additional facilities will be available to treat properly these wastes. It will be necessary to construct new sewer lines in at least two areas not presently served by a sanitary sewer now to solve the pollution problem of three industries. Some larger industries have decided it is more economical to treat their own wastes and are making plans to construct approved disposal facilities at this time.

There are 14 storm sewers which have been pinpointed as causing minor pollution to the South Platte River. These sewers will be surveyed to determine the source of pollution, which is no mean task in itself. This work will be accomplished in the near future. It is hoped the major portion of this water pollution problem can be corrected by the end of the year 1966.

S. Johnson

We have forwarded to the State and Federal agencies a detailed report showing the major industrial polluters within Denver and the results of laboratory tests made on the wastes sampled. In addition, this report contains statements showing action taken by the Department of Health and Hospitals to abate the pollution problem of each industrial source.

Thank you very much.

MR. STEIN: Thank you.

Are there any comments or questions?

MR. KLASHMAN: I have a question.

MR. STEIN: Mr. Klashman.

MR. KLASHMAN: Dr. Johnson, you mentioned that there are three industries where new sewers are going to have to be built in order to get them into the sanitary system.

What is the date that you anticipate that this will be done?

DR. JOHNSON: I don't think I can give you a date at the moment. I can tell you that the initial steps have been taken with the Public Works Department in Denver, to initiate the procedure to get a sewer line into that area.

MR. KLASHMAN: But do you have any idea whether it will be one or two years?

S. Johnson

DR. JOHNSON: No, I have no estimate at the moment.

MR. KLASHMAN: Thank you very much.

MR. STEIN: Thank you.

I think, Dr. Johnson, it is very gratifying that the city report so far and the State report and the Federal report seem to dovetail fairly well. I don't see any major contradictions.

Dr. Johnson, I think you pointed out something here which might be very significant, particularly in a city area, and that is the importance of having an integrated system. The industries are solving their problems to join up with the Metro system. Sometimes I don't know why more industries don't do that, because once you do, the legal and technical responsibilities of dealing with your wastes rest with the city and not with the industry.

I don't think that anyone who figures that they can haggle about on a sewer fee and get by a little bit cheaper is not buying more trouble by going it alone in a metropolitan area, when they possibly can join in with the metro system. I would strongly recommend consideration of this in this area.

As far as I can see, your system is developing in a splendid manner, and avoiding some of the pitfalls

S. Johnson

that some of the other municipal systems have incurred in their development. I think you have taken excellent advantage of the lessons to be learned in other parts of the country.

Thank you very much.

DR. JOHNSON: Thank you.

DR. CLEERE: Mr. Wayne Seaman, representing the Colorado Game, Fish and Parks Department.

W. Seaman

STATEMENT OF WAYNE R. SEAMAN, FISH
MANAGER, COLORADO GAME, FISH AND
PARKS DEPARTMENT, DENVER, COLORADO

MR. SEAMAN: Mr. Stein, Dr. Cleere:

Unfortunately, Mr. Bingham, who was to make our statement, took it with him -- he is our pollution biologist. However, I can give you the gist of it, and we can supply the written statement tomorrow.

It is quite short. We just want to reiterate that if the water quality standards as presented previously today are met and the construction and operations of the Narrows Reservoir proceeds as outlined by Mr. Dugan, there are definite possibilities in providing a warm-water fishery and allied recreational pursuits on the Lower South Platte River.

Fisheries-wise, I refer to such species as channel catfish and sunfish, and in some areas such as the tailwater area of Narrows Reservoir, we have a potential for species such as small and large-mouth bass, and possibly saugers.

We also wish to pledge our support both in manpower and facilities toward this effort, and to the new State Water Pollution Control Board.

W. Seaman

Thank you.

MR. STEIN: Thank you very much.

Are there any comments or questions?

(No response.)

MR. STEIN: Off the record.

(Discussion off the record.)

MR. STEIN: Thank you.

Dr. Cleere?

DR. CLEERE: Mr. Robert G. Wilson, representing
the Gates Rubber Company.

R. G. Wilson

STATEMENT OF ROBERT G. WILSON, ESQ.,
HOUSE COUNSEL, THE GATES RUBBER
COMPANY, DENVER, COLORADO

MR. WILSON: Mr. Chairman, ladies and gentlemen:

I am Robert Wilson, House Counsel for the Gates Rubber Company, and I am appearing here today in response to a letter that was presented to us by Dr. Cleere, asking that we make a brief statement at this presentation, at this meeting.

The Gates Rubber Company, being a good corporate citizen, is extremely interested in water pollution problems. The company has been taking steps to eliminate any possible pollution to the Platte River. Back in 1964, a meeting was held at Gates which was attended by Mr. Robert Gustafson of the Denver Public Works Department; Mr. Hayse Black of the United States Public Health Service; Mr. Bernard Sacks of the Colorado Department of Public Health; Mr. Lewis Parenteau of the Denver Health Department, as well as engineers on our staff. The purpose of that meeting was primarily to survey the effluent of the Gates plant, including both the sanitary and storm drainage. The survey was to determine not only the quantity of flow

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into the sewers, but also the condition of the water.

An inspection of the sewers at that time indicated that only small quantities of suspended solids were presently going into the storm sewers. These solids consisted primarily of small particles of rubber and carbon black, as well as minute particles of fibrous materials such as nylon, rayon or cotton, none of which would be harmful or toxic. There are no chemicals discharged into the sewers. Ninety percent of the water used in our manufacturing process is used for cooling purposes. Approximately one-third of the water used in the Gates plant is drawn from wells on company property, and two-thirds is purchased from the Denver Water Department. This water is recirculated from ten to twelve times through our system before it is discharged into the sewers. In excess of 36.5 millions of gallons of water per day are recirculated, and this makes our in-plant flow almost eight times the minimum Platte River flow. The overall contamination of the river by Gates is felt to be insignificant at this time. The biggest problem appears to be the quantity of process drainage being discharged into the sanitary sewers, and this drainage consists mostly of rubber particles which, of course, cannot be dissolved by oxidation.

An extensive survey and testing program has

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been underway at Gates for some time. Consulting engineers and outside laboratories have been employed to assist in the study. Several engineers on the Gates staff have been assigned to this problem on a full-time basis, and sampling of the in-plant flow and the effluent flow is selectively done on an around-the-clock basis two or three times weekly. At the present time, we are discharging approximately two million gallons of water per day, of which approximately 40 percent goes into the storm sewer and approximately 60 percent is discharged into the sanitary sewer. Even though our studies are not complete, Gates is now proceeding with a more complete and detailed design of a system that will re-use as much water as possible within the plant, as we have found many places in the present system where industrial water is being wasted through the sanitary and storm sewers. We now know where much of this wasting is occurring and can be eliminated. We also expect to reduce greatly the discharge into the sanitary sewer as well as to increase significantly the amount of water being recirculated. The system we are presently considering contains provisions for a complete separation of sanitary and processing wastes and is designed so that the process wastes will be deposited into a settling basin

west of the Platte River. This basin would be located so that the water would return to the river by filtering through several hundred feet of sand beds. There will be considerable amounts of money expended on this project, and, of course, it cannot be accomplished overnight.

One major problem which seems to confront everybody at the present time is the pursuit of a phantom goal. The State Water Pollution Control Commission was only recently created and, consequently, reasonable standards of quality of the waters of the State for the prevention, control and abatement of pollution have not been established here in Colorado -- nor will they apparently be established prior to January 1, 1967, which has been set forth as the date of compliance for recommendations made by the Federal Water Pollution Control Administration. In any event, the Gates Rubber Company is not knowingly going to be a source of pollution in the South Platte River Basin.

Thank you.

MR. STEIN: Thank you, Mr. Wilson.

Are there any comments or questions?

DR. CLEERE: Possibly, for clarification purposes, I should state that the existing State law with respect to standards governing effluents and discharges into streams will remain in force and effect until March 1st of next year, at which time we assume the new Water Pollution

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Control Commission will either adopt those standards, or new standards.

Thank you.

MR. STEIN: Mr. Wilson, I have one comment which, with the philosophy you expressed, I don't think is going to be any problem.

You indicated that, to the best of your knowledge and belief, the Gates Rubber Company was not contributing significantly to pollution of the South Platte River, and that your company policy certainly was to correct any source of pollution.

Now, here is what I would like to get clarified: In our survey, the Gates Rubber Company was listed as a polluter. After you made that statement, we checked with our technical people, and they inform us that when they made the survey they found 100 pounds of oil discharged in the Mississippi Avenue sewer daily by the Gates Company.

Now, is this still continuing?

Also, I might say, Mr. Wilson, this is the kind of discharge that I think generally when called, if it does exist, to an industry's attention as one that can be corrected in a reasonable manner.

MR. WILSON: Yes, sir. I don't recall when the survey was made. It apparently was made a couple of years

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ago, but since that time sumps have been installed in the plant, and grease or oil is skimmed out and put into the pit.

MR. STEIN: That very well may have taken care of it.

As I understand, the date of this survey was February of 1965, when the sampling was actually done. This may have been corrected since then.

MR. WILSON: Yes. We have been working on that problem, and we know that it did exist at that time. We have been working on it, and we haul the oil out in barrels and it is dumped in pits with the rest of our waste material.

MR. STEIN: Do you think you have that problem licked?

MR. WILSON: We think so, and, if not, we are still working on it.

MR. STEIN: All right. Thank you.

Mr. Klashman?

MR. KLASHMAN: Dr. Cleere, does Mr. Wilson also represent Gates Cyclo?

MR. WILSON: Gates Cyclo is controlled by the Gates Rubber Company. It is a separate corporation. I do not represent them.

Mr. Hayden, the President of Gates Cyclo, will

R. G. Wilson

be informed of the report, and I would like to have him here tomorrow, if possible.

MR. KLASHMAN: All right. Thank you very much.

MR. STEIN: Thank you.

Dr. Cleere?

DR. CLEERE: We will hear from T. L. Sundquist, representing the Wheat Ridge Sanitation District.

T. L. Sundquist

STATEMENT OF T. L. SUNDQUIST, VICE-
PRESIDENT, WHEAT RIDGE SANITATION
DISTRICT, WHEAT RIDGE, COLORADO

MR. SUNDQUIST: This is addressed to the
Department of Public Health:

In reply to your letter of April 5, 1966, with
enclosures, regarding the forthcoming South Platte River
Basin Conference, we note the following:

The Wheat Ridge Sanitation District serving an
urban area of approximately 7- $\frac{1}{2}$ square miles lying adjacent
to Denver's west line, was formed in 1947, and the primary
treatment plant was put in operation in 1948, operating
successfully with primary treatment until 1958, discharging
an effluent into Clear Creek which met legal requirements.

Due to provisions in the Sanitary Laws of January
1, 1957, and the fact that Baker Water and Sanitation
District were taking water for domestic use from Clear Creek
below our plant, the Health Department urged us to rush the
installation of secondary or complete treatment. This we
did, and we also installed chlorination in the plant and
have been operating successfully since 1958, discharging a
legal effluent.

It is our plan to continue to operate our

T. L. Sundquist

present plant at its full capacity until or unless it is to our advantage financially to deliver our sewage to Metro. As our area grows and our loads increase we plan to keep our plant in compliance with State Health requirements by dumping only our overload into Metro. The Wheat Ridge Sanitation District retains a recognized and competent laboratory to make plant control tests periodically to insure proper operation of the plant.

The District will have Mr. T. L. Sundquist, a member of the Board of Directors, as their representative at this meeting.

Thank you.

MR. STEIN: Mr. Sundquist, one point of clarification.

Do you chlorinate all year 'round?

MR. SUNDQUIST: Yes, sir. We put in a chlorination plant almost the same time we put in the secondary.

MR. STEIN: The question is, do you use it?

MR. SUNDQUIST: Yes, sir.

MR. KLASHMAN: Mr. Sundquist, the reason that we have recommended that Wheat Ridge go into the Metro plant is because from the analytical work which we have done, we found that your BOD and suspended solids removal are 73 percent and 78 percent, respectively, and our feeling is

T. L. Sundquist

that in order to achieve a warm-water fishery in the South Platte, if this is what we are able to do -- I mean, if we can achieve this -- that we are going to have to uniformly get up in the area of 90 percent.

The question I want to ask is, do you think you are going to be able to achieve this 90 percent? You haven't been doing it so far.

MR. SUNDQUIST: We have part of the time, sir. We have. We take tests about every week or two by this plant, and at times we have complied with that.

MR. KLASHMAN: Thank you very much.

MR. STEIN: Thank you.

Dr. Cleere?

DR. CLEERE: Is Donald D. Pfeifer present?

Mr. Pfeifer is representing the Denver & Rio Grande Western Railroad.

D. D. Pfeifer

STATEMENT OF DONALD D. PFEIFER, ESQ.,
REPRESENTING THE DENVER & RIO GRANDE
WESTERN RAILROAD, DENVER, COLORADO

MR. PFEIFER: Mr. Chairman, Dr. Cleere, ladies
and gentlemen:

I am appearing here on behalf of Mr. Warring,
the Chief Engineer of the Rio Grande Railroad, who is not
able to be here.

Unfortunately, I know very little about what our
water pollution problems are.

However, I would like to say, for the purposes
of this record, that it has always been the policy of the
railroad to cooperate fully with the Health Department, and
that is still our policy. We intend to comply with Dr.
Cleere's demands that we divert our pollutions that are now
going into the Platte River, into the new sanitary sewer,
as of January 1, 1967.

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: You know, a while ago, when we
became interested in this pollution problem, people raised

D. D. Pfeifer

the question of what happens when you flush the toilets on the railroads. Has that contributed to pollution?

Well, extensive studies indicated that the ballast they use for the railroad beds provided a wonderful sewage treatment plant just in itself, and by the time the material leaked out, there were practically no effects. We practically had a filter built in under the train, so this was one area where we were home free.

DR. CLEERE: It looks, Mr. Chairman, like we need a rail line in the bed of the South Platte River.

I wish to add my thanks to yours.

Is Mr. Morton Rechnitz present, representing Samsonite?

(No response.)

DR. CLEERE: I believe we have a letter to enter into the record from the Packaging Corporation of America.

Mr. Frank Rozich will read the letter for the record.

F. Rozich

STATEMENT OF FRANK ROZICH, CHIEF, WATER
POLLUTION CONTROL, COLORADO DEPARTMENT
OF PUBLIC HEALTH

MR. ROZICH: This is a letter from the
Packaging Corporation of America signed by Edward F. Boyle,
Manager of the plant.

"Packaging Corporation of America owns and
operates a paperboard mill in Commerce City,
Colorado. The production process of this paper-
board mill results in the discharge of waste
water containing both suspended solids and B.O.D.
Such waste water is presently being discharged
directly into the South Platte River without
secondary treatment.

"For a number of years, Packaging Corporation
has cooperated with the Colorado Department of
Public Health in an effort to reduce the volume
and the degree of impurities of the waste water
discharged by its mill. Recently Packaging Corpora-
tion has agreed with the Metropolitan Denver Sewage
Disposal District No. 1 to enter into a long term
agreement providing that its industrial waste water

F. Rozich

"will be delivered to the District for treatment in its new plant located adjacent to the mill site. The District has informed Packaging Corporation that it expects to complete the installation of a connecting line from the District's plant to the mill so that Packaging Corporation's waste water will be treated as soon as the District's plant is operating. It is understood that operation of the District's plant will commence in November 1966, and thereafter Packaging Corporation proposes to completely discontinue the discharge of industrial waste water directly into the South Platte River."

MR. STEIN: Thank you very much.

DR. CLEERE: I think we also have a written statement from du Pont & Company. Do you have that one available, Frank?

MR. ROZICH: Yes.

DR. CLEERE: And while he is looking for that, I will ask if Mr. Clyde R. Hampton, representing Continental Oil Company, is in the audience?

I will call on you next.

MR. ROZICH: This letter is signed by C. E. Watkins, Assistant Manager, du Pont Company, Louviers,

F. Rozich

Colorado:

"The Louviers, Colorado Works of the E. I. du Pont de Nemours & Co. manufactures Dynamite and Blasting Agents, with sales of Nitric Acid as an intermediate product. About 160 persons are employed with 144 on the day shift, 12 on the evening shift, and four on the midnight shift.

Raw materials used are principally Anhydrous Ammonia, Fuming Sulfuric Acid, Ammonium and Sodium Nitrates, Organic Fillers of Natural Materials, Glycerin, Glycol and Paper Products.

Water supplies consist of non-potable subsurface water used for cooling purposes and deep well (800 feet) water used for all purposes.

Contaminants and Treatment are as follows:

Approximately 300 gpm (430,000 g/day) of water is used for process cooling and is discharged uncontaminated into Plum Creek. About 10 lbs. per day of acid (nitric or sulfuric) is discharged with this effluent but does not alter its pH average. Acid content is less than 4 ppm.

Approximately 50 gpm (72,000 g/day) of water is used for cooling at the Nitroglycerin operation. This is not contaminated by the process but is subsequently

F. Rozich

"blended with other contaminated water which discharges approximately 22 gpm for 8-10 hours per day (13,200 gpd) and contains less than 0.5% of dissolved nitroglycerin. Other minor water flows which total less than 15 gpm carry small quantities of organic and inorganic materials removed as dust from air used to ventilate the manufacturing buildings. The combined streams are led to a retention pond approximately 1/2 acre in size where natural oxidation and chemical decomposition destroys the nitroglycerin content. The effluent from this pond flows by seepage into the subsoil and does not discharge directly into the watershed.

Domestic waters are discharged through septic tanks and leaching beds."

MR. STEIN: Thank you very much. You don't know if du Pont is going to connect to the Metro District, do you?

MR. ROZICH: They are too far away.

MR. STEIN: Thank you.

Dr. Cleere?

DR. CLEERE: Mr. Hampton.

C. R. Hampton

STATEMENT OF CLYDE R. HAMPTON, ESQ.,
REPRESENTING THE CONTINENTAL OIL
COMPANY, COMMERCE CITY, COLORADO

MR. HAMPTON: I am Clyde Hampton, attorney for
Continental Oil Company.

Continental Oil Company owns a refinery located
at 5801 Brighton Boulevard, in Commerce City, Colorado. This
statement is broken down into three parts. First, we should
like to present the physical facts concerning our refinery;
secondly, we will briefly discuss the problem which we face
as refiners; thirdly, we will discuss Continental's position
with respect to water pollution, what we have done in the past
and what we propose to do in the future.

I. Physical Facts.

Continental Oil Company's refinery was
originally constructed in 1930. A major revision was carried
out in 1948 to completely modernize and expand the refinery.
Since that time, numerous additions and revisions have been
made to expand further and modernize the refinery. A major
change was completed in 1959 with the installation of a
vacuum unit and revisions to other equipment to permit

C. R. Hampton

improved processing of residual oils. Continental purchased the facilities of Empire Oil Company in June of 1965, such facilities being immediately located across Brighton Boulevard from Continental's principal plant, and the facilities so purchased have been integrated into Continental's operation. Thus, Continental's refinery is a very modern facility, producing a full line of motor gasolines, heating oils, jet fuel, LPG products, residual fuel oil, asphalt, carbon black oil and gas.

In addition to a crude distillation unit, Continental's refinery has catalytic cracking facilities for the manufacture of high octane gasoline, a catalytic reforming unit to upgrade low octane straight run gasoline, vacuum fractionation and thermal cracking to reduce the yield of residuals, and catalytic polymerization for production of gasoline from gases yielded from cracking units. In addition to the major processing units, there are boiler facilities, cooling water facilities for conservation of water usage, tankage and loading facilities.

Continental Oil Company employs some 150 people at the refinery. Most of the products produced from this refinery are marketed within the State of Colorado. In addition to the people required by the refinery, a great number of other jobs are created by the necessity of transporting and marketing the products.

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II. Continental's Problem.

The problem which Continental Oil Company faces in regard to this matter is the inherent problem faced by every refiner. The problem, reduced to its simplest terms, is this: In order to produce marketable products from crude oil, a great amount of energy must be utilized to separate and convert the crude oil into its constituent parts and, in conjunction with such separation and conversion, great quantities of water are utilized. Our engineers have computed that 37 gallons of water are circulated in Continental's refinery for every gallon of crude. It should be emphasized, of course, that this water is recirculated and used over and over again. However, in the refining process, waste materials tend to accumulate in the water. The refiner's problem is to get rid of these waste materials without polluting the air or streams.

III. Continental's Efforts, Past and Future, and its Position.

Throughout the many years Continental has operated its refinery it has been our policy to maintain the refinery in a businesslike and efficient manner, which would

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be acceptable to both the stockholders and the neighboring community. Good housekeeping is an integral part of our doing business. The minimal number of complaints we have received is, we believe, testimony of our success.

We have been very cognizant of the problems of water pollution in the past, and we have taken a number of voluntary concrete steps heretofore. These steps include the following:

A. Some years ago we installed oil recovery traps to minimize oil contamination; subsequently, we provided a final holding tank to clarify the effluent water.

B. In 1958 Continental installed a biological oxidation pond and related facilities. This installation is not common for refineries in the Rocky Mountain Region and has drastically reduced the phenolic effluent. The investment required for this installation and accessory equipment was in the neighborhood of \$100,000.00, and these facilities now cost approximately \$1,500.00 per month to operate.

C. Continental reduced the corrosion control chemical treatment level last year with a consequent reduction of the chromium present in the effluent.

D. At a cost of approximately \$5,000.00, Continental has revised its slop dehydration system in mid-1965, resulting in improved oil-water separation and

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consequently the reduction of oil in our effluent water. The sour water system has likewise been revised during the past year at a cost of approximately \$4,100.00, with a consequent reduction of phenol in our water.

E. The temperature in the processing equipment at the asphalt unit (formerly Empire Oil Company's plant) is being reduced from 810° F. to 750° F., with a consequent reduction in the concentration of phenol discharges.

F. Continental has been able to find a market for the spent caustic wash solution used in treatment of hydrocarbons. This is not an economically profitable venture, of course, but does provide a way, in part, to get rid of effluent containing phenols.

G. Within the past several months, Continental Oil Company has appointed Dr. James C. Kirk, a chemist, as Director of Environmental Conservation. Dr. Kirk, a well-qualified chemist, will be devoting full time to pollution problems at all Company installations, indicating the importance Continental places on these matters.

For many years Continental has been aware of the effluent water waste from our refinery and, as the above indicates, we have taken many steps to constantly decrease the contaminants in the water. We have always taken pride in being a leader in the petroleum industry in this

C. R. Hampton

Region, and this includes pollution abatement. We have, we feel, done a competent job. We were frankly surprised by the letters which we received quite recently from the State Health Department, indicating the need for some improvement in reducing the phenolic and chromium content of our effluent water. Past contacts with governmental agencies had indicated satisfactory controls on our part.

However, we intend to cooperate fully with water pollution control authorities in these matters, and at this time we propose to take the following steps:

A. We shall continue to conduct the study heretofore undertaken in updating Continental's audit of its pollution problems.

B. Continental is investigating new water treatment systems to assist in elimination of chromium, and will study the feasibility of other specialized equipment for chromium removal.

C. It is hoped that an alternative disposal system might be found such as the new sewerage facilities of Metropolitan Denver Sewage Disposal District No. 1.

D. If the cost of such alternate disposal system is prohibitive or impossible to work out, study will be given to the feasibility of enlarging the biological oxidation pond or constructing new holding ponds.

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It will certainly be Continental's position to cooperate fully with all water pollution authorities. Continental's personnel have heretofore participated in technical committees and panels, and we intend to do so in the future. We feel that Continental has professionally-qualified people who can be of substantial assistance to water pollution authorities. Continental has always kept pace with the increasingly stringent restrictions for pollution prevention. We intend to continue this philosophy even though we recognize this will mean additional moneys must be budgeted for water pollution control equipment. We feel that the matter of water pollution should be controlled by officials at the lowest effective governmental level. We plan to work quite closely with the Colorado Water Pollution Control Commission in the setting of standards. We believe that the streams of the State of Colorado must be cleared up, but that the highest beneficial use of each segment of the Platte River must be recognized. In our opinion, the South Platte River should be viewed as a resource which must be conserved, and recognition should be given to the fact that maximum use may be made of this resource by the setting of intelligent standards commensurate with the needs of industry and the community.

We should like to thank you for this opportunity

E. R. Hampton

to appear before you, and it is hoped that our comments may be of value to you.

Are there any questions?

C. R. Hampton

MR. STEIN: Thank you, Mr. Hampton.

Are there any questions or comments?

(No response.)

MR. STEIN: I know your company has been cooperative and I agree with your philosophy that it should be handled at the lowest level of government, although you did invite us into your operations and laboratories at Parker City several times to look at the development of the new detergent base.

I don't know if you still are, but you used to be in the business and were one of the largest suppliers of ABS. Are you still supplying it?

MR. HAMPTON: Our chemist nods his head "yes."

MR. STEIN: I guess you are.

Well, I will say this: Continental was one of the firms that pioneered the research in putting out the material for a soft detergent, and in line with their policy, although we didn't obviously broadcast it at the time, the laboratories were always open to us. Even an enforcement officer like myself could come in and see what they were doing.

So we do recognize this as a long-standing policy for Continental.

Mr. Klashman, do you have any questions?

C. R. Hampton

MR. KLASHMAN: Mr. Hampton, I believe that Continental also operates the Empire Oil Company as Continental Asphalt?

MR. HAMPTON: Yes, that is right. We purchased these facilities in June approximately of last year, and these facilities have been integrated into the Continental facilities. It is an asphaltic unit.

MR. KLASHMAN: We did some work in late 1964 -- I know that is quite a while back -- in which we found some phenols of about 700 parts per billion. Empire was using an unlined settling pond for oils, in addition.

Do you have any plans for improving on this?

MR. HAMPTON: Well, I think, of course, the problem, as you know, Mr. Klashman, will really be the problem of what is the standard.

Being so new, I don't think really our plans have been fully formulated with respect to the former Empire plant. Obviously, the phenolic count out there is not as low as our own, our own being, we felt, a very reasonable figure; but the same attention that has been given to our own plant I can assure you will be given to the old former Empire plant.

Beyond that, the new figure was just too new for us really to make any more definitive statement now.

C. R. Hampton

MR. STEIN: I think there are two wastes we considered here. One was phenols and the other was chromium.

Your statement indicated that you wanted to get all the chromium out, if you could. The question here is that we have phenols. I asked our technical people when they made their report. They indicated that they wanted it to get down to about 25 parts per billion and a complete removal of chromium.

Now, I would suspect that at least with the chromium, from what you said, it needs a little work yet. How about the phenols?

MR. HAMPTON: The chromium, our chemists tell us, will be the easier problem of the two to solve. This will involve an evaluation of a number of different types of treatment. The chromium, of course, is used as a corrosive-resistant material, and this is a technologically feasible operation.

Of course, on the figure for the phenol, this figure we were not made aware of until today, so I would just simply say that while our chemists didn't faint, they blanched, and I think that again the statement must stand on its own feet here, that we are going to have to do a considerable amount of evaluation, of course, which will depend upon further work and efforts of the Colorado Water

C. R. Hampton

Pollution Control Commission to see the figure that they will come up with.

Now, our phenol count is a very low one for Rocky Mountain Region refineries, and we will do our level-best to make it lower still. Some of the efforts that have been made have somewhat lowered that.

For example, specifically in the old former Empire plant, under the use that is contemplated, there will not be as much heat necessary in order to accomplish the same job, and therefore there will be a consequent reduction in the phenolic count.

MR. STEIN: Well, in dealing with these problems, obviously, as you pointed out, you have the problem of every refinery.

I was surprised at the liberalness of the figure on the Platte. Maybe they don't have too many chemical industries here putting out phenolic substances, and the aggregate isn't too much; but in the St. Louis area, for example, the parts per billion allowable discharge that we started off and went around with was 2 parts per billion, which was pretty low. As you know, however, they have considerably more refining activity and chemical industry activity in the St. Louis area, both on the east and west sides of the rivers. Of course, they have a lot more water

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to carry it away than you have too.

However, I don't know -- we had a problem on the lower end of Lake Michigan. They came up with a phenol number on Lake Michigan. Did we come up with a discharge number, Mr. Kittrell?

MR. KITTRELL: That was in the lake itself, of one part per billion.

MR. STEIN: One part.

What I am saying, Mr. Hampton, is that I don't think that the 25 figure here, from what I have seen in the other cases, is as tight as the ceiling proposed in some other places, and I suspect that the reason it is so loose here is that you are not saturated with the manufacturing chemical industry or the petro-chemical industry surrounding you, each one of you putting this in.

So again I recognize that once you begin cutting your phenols below 1,000 parts per billion, the going gets tough. You go scrambling for every part after that. It is kind of easy when your count is real high to knock it down, but once you begin getting that down to that 1,000 figure, it is very, very difficult to push to get to any lower figure. But, I hope that this cooperative program will result in the phenols getting down to an irreducible minimum.

Thank you.

Do you have anything to add?

MR. HAMPTON: No.

MR. STEIN: Thank you very much.

Dr. Cleere?

DR. CLEERE: Mr. W. C. Kunzman, representing
the Kumer-Empson Company.

I think, Mr. Chairman, we plan for this to be
the last speaker of the day.

MR. STEIN: All right.

W. C. Kunzman

STATEMENT OF WILLIAM C. KUNZMAN, ASSISTANT
TO THE PRESIDENT, KUNER-EMPSON COMPANY,
BRIGHTON, COLORADO

MR. KUNZMAN: Mr. Chairman, Dr. Cleere, members
of the group:

My name is W. C. Kunzman. I am Secretary and
Assistant to the President of Kuner-Empson Company. We are
packers of canned foods, with our headquarters in Brighton,
Colorado. We have plants in other sections of Colorado,
but today we are dealing primarily with our Brighton plant.

The recommendation made was to divert present
industrial waste discharges from the South Platte River
and the McCann Ditch to the sanitary sewer, and the date of
compliance would be January 1, 1967.

I wish to read into the record the following
statement:

The Brighton, Colorado, production plant of
Kuner-Empson Company is engaged in the seasonal packing of
snap beans, cucumbers, and peppers between July 25 and
October 1. Cabbage cutting for sauerkraut takes place
intermittently between August 1 and October 15. During
the balance of the year, cured pickles are processed and
packed along with approximately six weeks of sauerkraut

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packing.

All sanitary sewage is discharged to a line connected with the disposal system of the City of Brighton.

Industrial waste water is discharged to the Platte River. Prior to this, the solids are screened out and disposed of in a sanitary fill, leaving a residue of some suspended solids in the water. The volume of the water during the summer seasonal operations is approximately 14,000 gallons per hour and during the winter operations approximately 5,000 gallons per hour. This is for a period of approximately 12 hours per day during the summer season and 9 hours per day during the wintertime.

The suspended solids consist mainly of dirt washed from the freshly harvested crop along with vegetable material too small to screen out which enters the water during the time of preparation for canning. Some of the waste water contains small amounts of sodium chloride (salt) and acetic acid (vinegar).

We have requested the city of Brighton to consider the possibility of the company discharging its industrial waste water into the city sewer for treatment. As of this time, we have had no answer from the city, and understandably it will require considerable study on their part.

W. C. Kunzman

As a matter of policy, our company concurs that there is need for pollution-free streams and water supplies. We also must be sure that the cost of any program worked out with the city to accomplish full treatment of waste water will not have a damaging economic impact on our operations.

MR. STEIN: Thank you, Mr. Kunzman.

Are there any comments or questions?

(No response.)

MR. STEIN: Thank you.

MR. KUNZMAN: Thank you very much, sir.

MR. STEIN: With that, I think we are making very good progress in getting the record filled out and the views expressed.

We will reconvene at 9 -- I repeat -- 9 tomorrow, and we hope to complete this tomorrow.

We stand recessed until 9 o'clock tomorrow morning.

(Whereupon, at 5:05 p.m., an adjournment was taken until Thursday, April 28, 1966, at 9:00 a.m.)